What's in This Issue

An often heard criticism of wage premium plans is that they are figured by methods too complicated for most workers to understand. In setting up its **incentive plan, Brown & Sharpe** has carefully avoided this weakness. The method is described in detail on page 796.

Morse Chain has done a lot of **plant modernizing** the past two years, especially in its sprocket shop. What has been done and the results obtained are outlined on page 800.

Men in small shops, job shops and in maintenance departments of large production plants are always interested in time-saving methods that can be rigged up in short order to keep down costs. Page 791 is devoted to a **series of small shop kinks**, is illustrated with sketches to get the ideas over quickly.

Tool room checking systems vary from shop to shop. C. H. Borneman of General Electric made a careful study of the system he had been using and discarded it for another which keeps his records complete without holding up progress. Tool supervisors who have trouble with this problem will be interested in his solution on page 789.

Despite its reputation for mass production, the automoti e industry contains companies manufacturing in small lots. Walter Motor Truck operates on that basis. On page 792 Herbert Chase describes how it has solved some of its production problems.

From England comes a **suggestion on die-casting die making.** W. M. Halliday, faced with the problem of modifying an existing die, used a swiveling core which seems to give promise of other applications. Read about it on page 803.

C. W. Hinman continues his series on the press-working of metals with an installment that deals with **press chutes and magazine feeds.** The current installment is on page 805.

Are you interested in **books on metal-working?** Our "New Books" section is on page 827 and gives a brief summary of late literature.

An ever-popular department, **Shop Equipment News**, continues to reflect the activities of manufacturers offering new products. Beginning on page 813 will be found a **wide variety of new equipment** including an internal grinder and improved six-spindle automatic lathe, a light duty internal broaching machine and a new vertical hydraulic drill.

Things are happening fast in industry nowadays. *American Machinist's* **News of the Industry** is edited especially to keep you in touch with them. The News Section starts on page 812a.

COMING

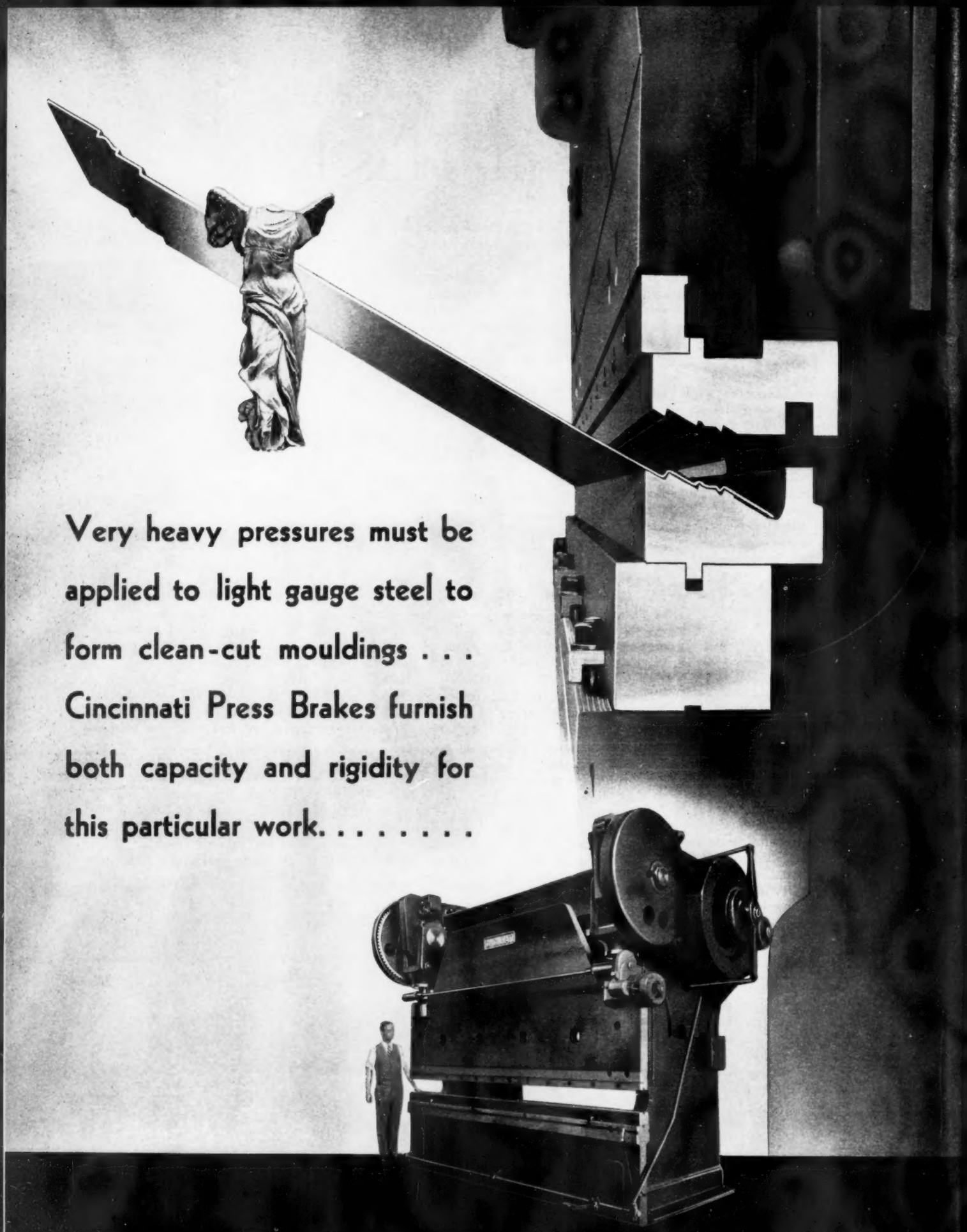
By this time you probably have heard something about the Public Relations editorial campaign which we, along with other McGraw-Hill papers, intend to wage. It will get under way in a spectacular fashion in our next issue with a 32-page insert on "Public Relations in Industry." The purpose of this insert will be to tell why the good will of employees and of the public is important and what can be done to secure it. Suggestions for public relations programs will be included. You will have a chance to check a list of activities to see whether your own program is complete.

The story of what machines have done for the shop employee in raising his standard of living will be presented in vivid style. Charts and graphs have been discarded in favor of a more dramatic method of de scribing the benefits of the machine age.

In producing modern tractors, the Minneapolis Moline Power Implement Company has based its methods on the use of standard machine tools provided with ingenious holding fixtures. Since the problem of this concern is so similar to that of others handling limited production lots, we feel that many of our readers will find a good deal to interest them in this article. It will appear in the next number.

We have published a great deal about apprenticeship systems in the past, but we find that the subject is one of continued interest. An article shortly to appear will tell how the Murray Corporation trains boys for its work in automobile body building. One of the features of the plan is an optional night course whereby the aprentice can obtain a thorough going industrial education in a wide range of subjects.

Tough work in the fields is backed by tooling in the shop



Very heavy pressures must be applied to light gauge steel to form clean-cut mouldings . . . Cincinnati Press Brakes furnish both capacity and rigidity for this particular work. . . . . .

THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS · SHEARS · BRAKES

AMERICAN MACHINIST

ESTABLISHED 1877

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BURNHAM FINNEY, Editor

Management's No. 1 Job

IT IS FITTING that the International Management Congress should meet in Washington this month. Management of industry has never been faced with so many perplexing problems as it is today and an open discussion of them will be helpful.

Formerly management considered that its job was done when it concentrated attention on such matters as economical and efficient manufacture of goods and their sale, development of markets, payment of good wages and adequate financing of the business. But such ideas no longer represent the full scope of management's activities.

Tantamount to these responsibilities in importance is the job of industrial and public relations. Management may have well in hand all of the problems which heretofore engaged its thoughts and still be stymied if it has neglected to cultivate the good will of its employees and of the public. How many instances one might cite of companies with impeccable manufacturing and sales set-ups, good markets for their products, wages and working hours in line with today's standards, yet stalled by sour relationships with their own employees and with the citizens of their communities.

Just how to create that good feeling toward management which is so essential to every business today is no easy task. And the company which thinks it easy and which relegates the problem to a secondary place is in for trouble. The job is a first-rate one which must not be looked upon as something to meet a present emergency. It must permanently become part and parcel of the fabric of the company itself. It must be handled with the same skill as other major problems of management.

There are plenty of small companies which will say, "That is fine for the big fellows, but after all we are only small fry. We obviously cannot go in for an elaborate program aimed to secure and hold the good will of employees and of the public. In fact, we don't have to because we are not faced with the same problems which confront the larger companies. We know all of our shop men and they are all right. That stuff about public relations applies to the other fellow, but it doesn't affect us."

The truth is that every manufacturer, regardless of size, has a job to do in building good will. That job will vary in intensity with the size of the company, but just because a company is small does not mean that the job isn't there to be done. One company with a bad reputation in the community can do harm to all other companies in the same city.

With management's methods and problems being scrutinized at the International Management Congress, it is time that industry recognizes its No. 1 problem and gives it the attention which it must have if the system of private enterprise is to continue.

WE RECALL the words of Philip Cabot speaking to the alumni of the Harvard Graduate School of Business Administration:

"His factory is in fact a society which he (the manufacturer) has brought into being, and to confine his attention to the economic and technical aspects of his business while neglecting the society which is his child, and the well being of which is essential to the long-time success of his economic aim, would amount to an admission of incompetence. In the business world incompetence is the unpardonable sin."

Gaging Business

THOSE who predicted a fall upturn in the metal-working industry will not be disappointed. Though machinery purchases have not been large, they are slowly expanding and inquiries are in considerably greater volume. Manufacturers and dealers look for an active fourth quarter, with orders coming mostly from federal government agencies and from foreign countries rather than from private domestic sources. Bookings from the army, navy and shipbuilding companies should be sizable. Under the influence of a growing number of small orders, steel operations continue to point upward.

Although the present steel ingot rate stands at 39.9 per cent, a correction for the Labor Day shutdown would boost this figure to around 46 per cent, representing a gain of some 4 per cent over last week's rate.

Prospects of reasonably good sales during the fourth quarter, plus a shortage of new cars in dealers' hands, have spurred automobile companies to speed up fall car assemblies. The outlook for farm implement sales is considered good, though farm incomes have been cut by lowered crop prices. Major engineering construction awards last month were the highest for any August since 1930. Public utility companies are reported planning substantial expenditures for plant improvement before the year's end. Business Week's Index of Business Activity is at 62.6, compared with 61.6 a month ago.

BOSTON—Machinery sales are expanding. Textile mills and metal-working companies making auto accessories report a pick-up. Industrial electrification is more active. Newport naval torpedo station is buying grinders and Boston Dry Dock Co. is modernizing its plant.

BUFFALO—Steel output is around 50 per cent, the highest level since last fall, and Bethlehem's continuous strip mill is back on a five-day-a-week schedule after running two or three days a week for the past seven months. Business is in small lots, but volume is steadily mounting.

NEW YORK—Government orders have been the only factor to enliven the domestic market. Prospects for equipment sales to Japanese and English interests are much improved. The French may be in the market soon in connection with their preparedness program, especially in aircraft.

PITTSBURGH—Things continue to look up in steel, what with orders increasing and mills rolling some steel in anticipation of automotive releases this month. Steel plant machinery builders have received fair-sized orders from Russia. Industrial activity is up slightly, judged by the University of Pittsburgh's index.

CINCINNATI—Machine tool bookings are down. The outlook is fairly hopeful, however, with machinery builders relying on government purchases and further export business to stimulate sales. At Dayton, Frigidaire was closed last week. Other General Motors divisions are at 60 percent. NCR is doing well, and Airtemp is running at about 50 percent.

CHICAGO—Improvement, is noted, but signs of a sustained upturn are lacking. Continued gains in miscellaneous buying, plus structural orders for public construction work, have boosted steel operations. Farm implement output is poor and fall sales may be adversely affected by low crop prices. Auto parts companies at Milwaukee expect releases this week enabling them to resume activities. Household electric manufacturers are reported building up inventories in anticipation of holiday trade.

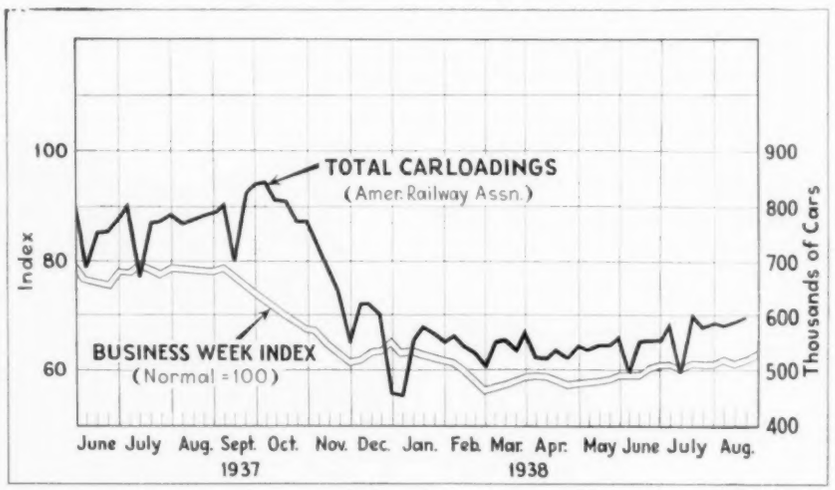
CLEVELAND—Auto parts plants are gradually enlarging their production. Machine tool companies say their business was better in August than in July. Steel mills report slowly mounting operations.

DETROIT—Industrial power consumption last week was higher than in any other week this year. Machine tool inquiries are gaining, but purchases are light. Much tool and die work for '39 models was placed outside Michigan because of unsettled labor conditions here. Car makers are expected to buy small tools in about thirty days.

SAN FRANCISCO—Airplane production is the brightest spot in Pacific Coast activities. Lumber output has caught up with sales, causing a tapering of operations. Labor troubles are responsible for uneasiness in many lines. Building is increasing.

FREIGHT CAR LOADINGS VS. GENERAL BUSINESS

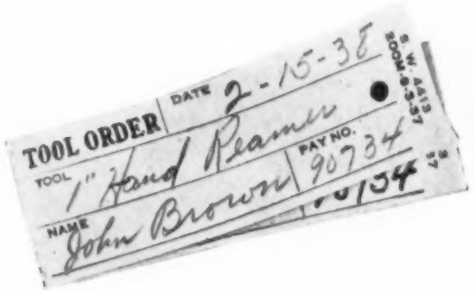
Authorities expect the upward trend of carloadings to become stronger and more definite, a reflection of the improving tone of business



A Double Check on Tools

The troublesome task of keeping track of tools yields to a plan that is complete without being cumbersome

C. H. BORNEMAN
Supervisor, Tool and Gage Service Department
Schenectady Works, General Electric Company



TOOLS READY at a moment's notice, yet all quickly accounted for, is the object of G.E.'s system of control now in use at Schenectady. This plant turns out tailor-made apparatus of many kinds in a wide range of sizes so that the tool crib system has to be a jobbing shop basis. To prevent delays and unnecessary purchases, tools not in use must be available to all departments. The system, successfully employed for over a year, does all of this and has justified the change-over from the slip-and-brass check system that it displaced.

Under the old system, each man had a number of brass checks, usually ten, charged to him but retained in the crib. When he needed a tool, he filled out a tool order which was placed in a file pocket near which his tool checks hung. A check was moved to the storage-space hook and the tool handed to the man.

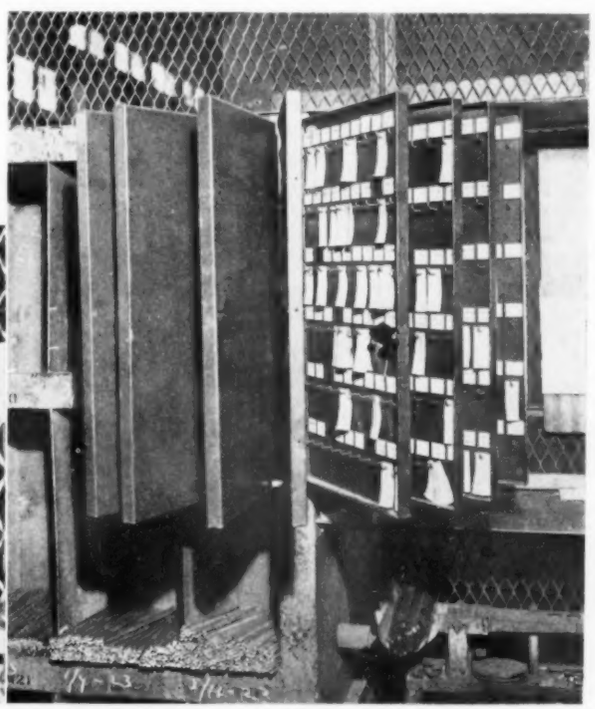
Under the new system, tool order slips, in duplicate, are kept in dispensers at both sides of each tool crib window. They are obtained, one pair at a time, by passing a finger under the bottom of the container. The top slip is carbon-backed so that writing in pencil on the first slip is reproduced on the second.

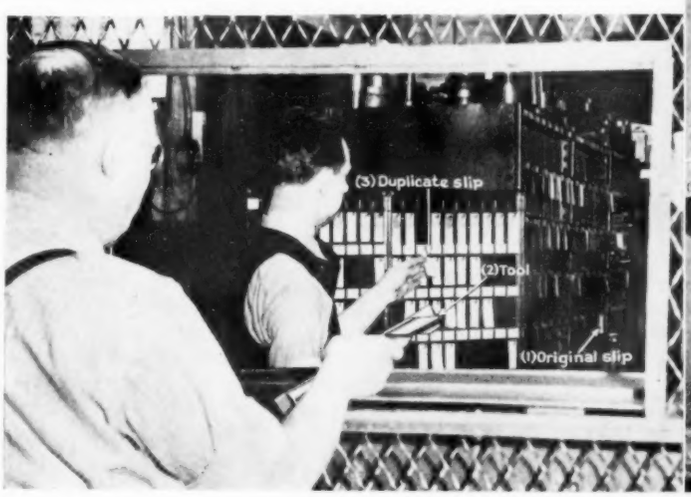
A date stamp is available for stamping both slips. If the tool crib keeper has time, he dates the slips before placing them in the dispenser. The tool-crib keeper hangs the original slip on a hook at the tool-storage rack and then hands the tool to the workman. At his convenience, he hangs the duplicate slip on a hook assigned to the workman on a rack near the crib window. These slips show what tools each man has drawn from the crib. In the larger cribs these hook racks are arranged in "books."

When a tool is returned, the duplicate slip covering that tool on the man's hook is removed by tearing through the punched hole. The torn slip is shown to the workman to indicate that he has received credit for returning the tool; then it is kept with the tool until it is returned to the storage space, regrind tray or scrap box. The original slip is removed from the storage-space hook. Tools broken or worn out are so noted on the torn order slip, which then is placed in a "replace" container for information

(Right) Racks in larger tool cribs are arranged in "books" to conserve space

(Below) The original slip is hung on a hook at the tool storage space and the duplicate copy is hung on a rack hook assigned to the workman





of the man who must reorder them.

For borrowing tools from other departments, each tool crib has a limited number of brass tool-crib checks serially numbered on one side and marked with the tool crib number on the other. For each tool-crib check there is a brass slip of the same serial number. The use of a distinctively marked brass tool crib check is a precaution to prevent unauthorized borrowing from tool cribs of other departments.

When a required tool is not available in the home crib, both tool order slips are marked with the number of the home crib and a tool crib check serial number. The original slip then is placed on the hook from which the correspondingly numbered brass slip and tool crib check have been removed. The tool-crib check is handed to the man and the brass slip is hung on his hook. If a messenger is sent for the tool, the man retains his original slip until the tool is delivered to him.

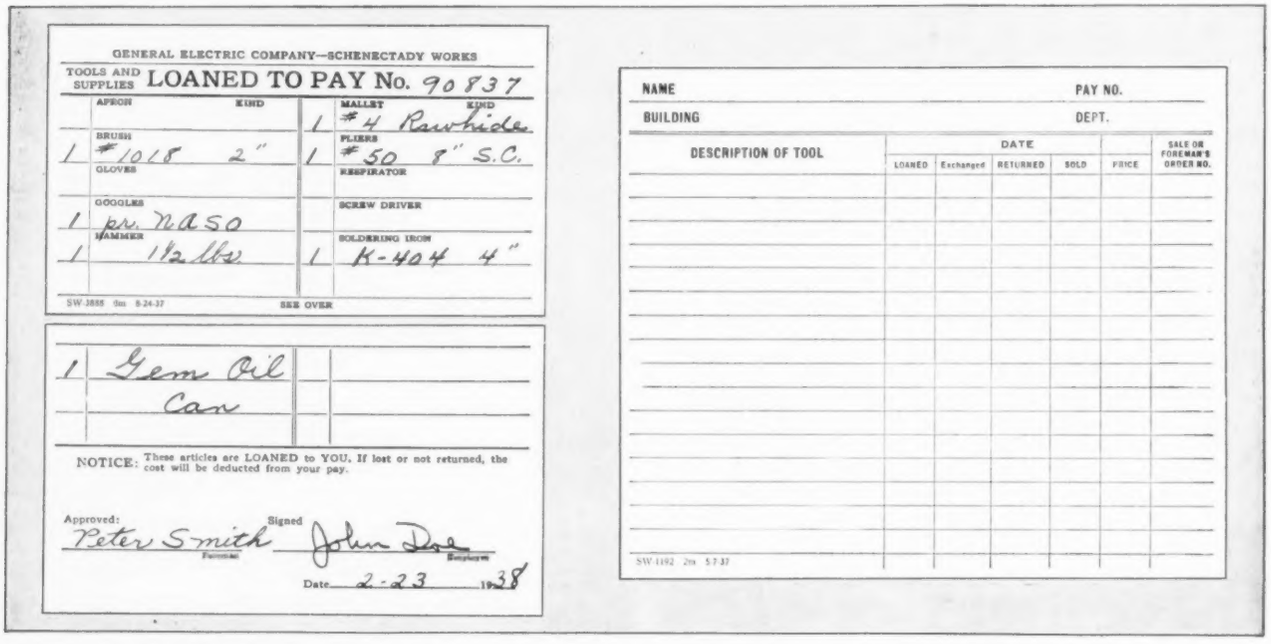
The workman or messenger, as the case may be, hands the duplicate tool order slip and the brass tool crib check to the keeper of the lending crib in return for the tool. The brass check is hung on the hook at the tool storage space, and the slip is placed on a hook labeled "Other Crib Loans."

The man can return the tool to his home crib or to the crib from which it was obtained. In the former case, the brass slip is removed from the man's hook and returned to its original hook, from which the original tool order slip is torn. This slip is kept with the tool for identification. Upon receipt of the tool by the lending crib, the duplicate slip is torn from its hook on the rack and the tool crib check is returned to the borrowing crib. In case the workman returns the tool direct to the lending crib, the above procedure is reversed and the workman returns the check to his home crib instead of the tool. This clears him of responsibility for the tool.

This tool crib system accomplished the following: (1) it shows immediately who has a given tool and how long he has had it; (2) it shows all of the tools for which a given workman is responsible; (3) it reduces time spent by workmen at tool crib windows; and (4) it eliminates unnecessary filing of slips.

All of the foregoing relates to tools borrowed to be used for a relatively short time. Tools which a workman retains for a long time are charged to him on a loan card. This notation is transferred to a record card in a central file for the entire works. The central file record of tools eliminates repeated thumbing over of slips.

When a workman leaves the employ of this works, he first clears his account at his home crib. This, of course, means that he must have returned all borrowed tools to other cribs. Then he returns to the central file the tools charged to him there.



GENERAL ELECTRIC COMPANY—SCHENECTADY WORKS

TOOLS AND SUPPLIES **LOANED TO PAY** No. 90837

	APRON KIND		MALLET KIND
	BRUSH	1	#4 Rawhide
1	#1018 2"	1	PLIERS #50 8" S.C.
	GLOVES		RESPIRATOR
	GOGGLES		SCREW DRIVER
1	pr. NASO		
	HAMMER		SOLDERING IRON
1	1½ lbs.	1	K-404 4"

SW-3885 9m 8-24-37 SEE OVER

1	Gem Oil Can		

NOTICE: These articles are LOANED to YOU. If lost or not returned, the cost will be deducted from your pay.

Approved: Peter Smith (Foreman) Signed John Doe (Employee)

Date 2-23 1938

NAME PAY NO.

BUILDING DEPT.

DESCRIPTION OF TOOL	DATE LOANED	Exchanged	RETURNED	SOLD	PRICE	SALE OR FOREMAN'S ORDER NO.

SW-1192 2m 5-7-37

(Left) **Tools that a workman is to retain for a relatively long time are charged to him on a card that he signs when given the tools.** ***(Right)*** **Tools issued on a loan card are recorded on cards in a central file**

Cure for Craters

C. G. WILLIAMS

Some months ago I was demonstrating sintered carbide tipped tools in a plant noted for its line of airplane motor carburetors. When machining the four bores of these bodies, the firm had plenty of trouble in obtaining the required finish in the bores. The surface was full of small craters and scratches, all of which had to be eliminated before the body could be used.

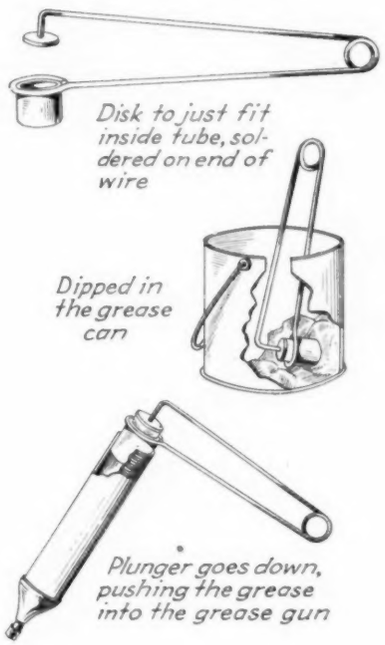
I was asked to give some assistance if possible, or at least to study the operation to see if a suggestion could be made. The machine was a Heald Bore-Matic, the tool sintered carbide, and not tipped with the material which I was demonstrating. After about four hours spent studying the surface of the bores and two more hours watching the machine when running, I told the foreman, "I think that the difficulty can be removed by simply regrinding the tool."

A change in the contour of the tool was made which did not take over ten minutes; and the remainder of the lot consisting of 24 bodies, each with four holes, was completed in about three hours. There was not one that did not pass inspection.

SHORT CUTS FOR THE SMALL SHOP

A. H. WAYCHOFF

A machinist who was tired of messing around with a paddle and getting more grease on his hands and outside of the grease gun than on the inside made a filler that did the trick. He took a couple of feet of spring wire and bent it into the shape of a pair of tongs, forming the loop at the end by taking a few turns around a broomstick. Then he bent one end of the wire into an eye, and soldered a 2-in. scrap of tubing into


Disk to just fit inside tube, soldered on end of wire
Dipped in the grease can
Plunger goes down, pushing the grease into the grease gun

it. The tubing was just the right diameter to slip nicely into the grease gun. He bent the other end of the wire to a right angle and left the bent part about as long as the piece of tubing. Then he soldered a disk on the end so it would act as a plunger inside the tubing, and his filler was done. To use it, he just scooped it into the can of grease, poked the tubing inside the gun and squeezed the handle. Just a few scoops and the gun was full, with no mess or wasted grease

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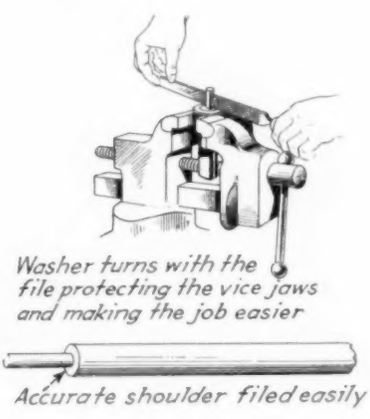
Holding a tapered shaft in a vise has always been somewhat of a problem. The trick illustrated is simple to make and will adapt itself to any taper within the range of the vise jaws. A solid center gear about an inch thick, like those used for automobile timing gears,

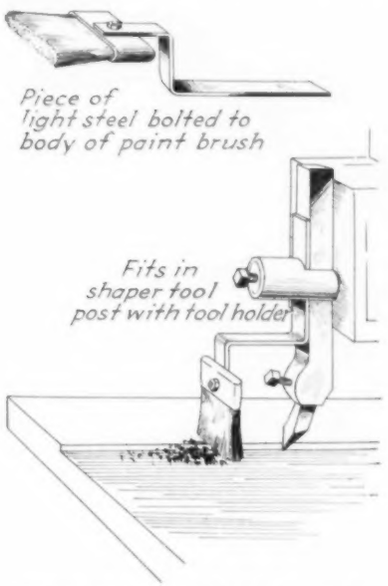
is cut so as to get two identical segments. The length across the face of each cut should be about equal to the width of the vise jaws. In use, the segments are meshed together and placed between the work and one of the vise jaws. As the vise is closed, the gears will conform to the taper of the piece and hold it securely

•

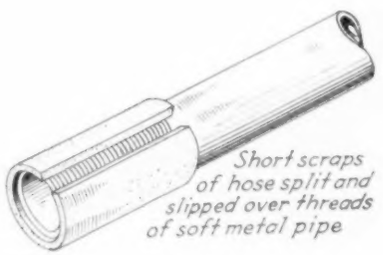
Anyone who has had to file a reduced diameter or a shoulder on the end of a rod knows how easy it is to mess it up. Slipping a washer over the rod after it has been caught in a vise will make the job a lot easier. Use a washer that will turn freely on the rod, and clamp the rod so the top of the washer is just where the shoulder is going to be. Let the file ride on the washer, and you'll find it a lot easier to get a square, accurate shoulder. And without scarring up the top of the vise jaws, either



Lots of machinists have other things to do besides brushing the chips off work being machined on a shaper. A paint brush mounted ahead of the tool will do the job just as well. One of the simplest ways of fastening it is to cut off the handle and drill a hole through



the body. Take a piece of strap iron the same width as the tool holder and drill a hole in one end. Bolt the brush to it, and then bend it so as to clear the tool when clamped in the tool post. Thus it can be adjusted without any trouble, and the chips won't get under the tool point and dig into the work



The threaded ends of copper, brass, or other soft metal pipes are often damaged when the pipes are stored in racks or thrown around much. This can be prevented by slipping a short length of split hose over the threads after they are cut. The pieces are cut from all sizes of scrap hose and kept in a handy box near the pipe bench

Heavy Trucks in Small Lots

With production geared for about 500 units annually, the Walter Motor Truck Company's plant differs in many respects from plants making lighter trucks in large quantities

HERBERT CHASE

WHEELS FOR Walter four-point-positive-drive trucks are mounted on dead axles and arranged for internal gear drive through universal shafts. Gearsets, differentials, axles, wheel housings and certain other parts, including frames, are necessarily of rather special design. Many heavy forgings and steel castings are required. It is on these and some other items peculiar to the Walter trucks, snow fighters and heavy trailer equipment, that most of the machine work in the plant is concentrated.

Engines, clutches, gears, electrical equipment and many other items are available in satisfactory form from outside producers. These are purchased in finished condition, since such a policy has ben found to result in worthwhile economies. The company, however, manufactures in its own plant most of the parts peculiar to its own design of truck, since this can be done at a cost equaling that possible in outside shops with highly desirable control over the production. Forgings and castings all are purchased from specialists, but machining of such parts is done in the Walter plant. In general, parts are run through in lots ranging from 25 to 200, depending on requirements. These either are placed in stock and withdrawn as needed, or are delivered to the assembly groups at once.

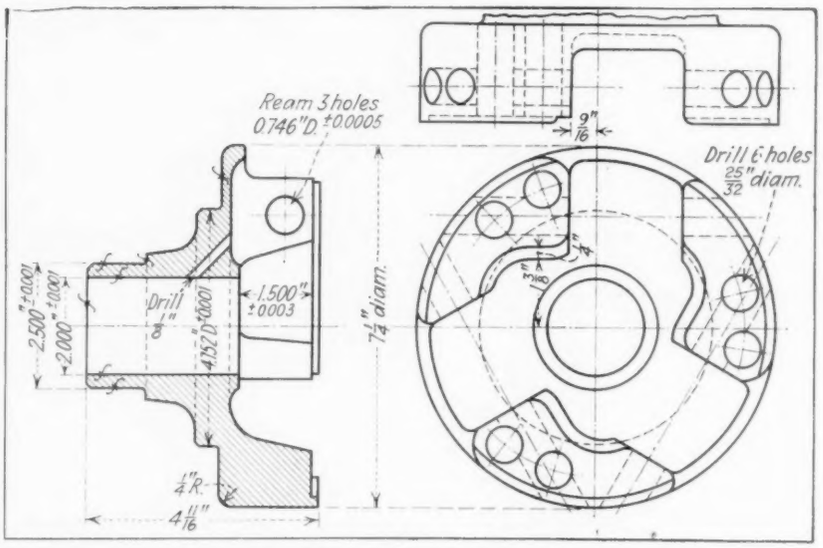


Fig. 1—This manganes steel differential case is machined from a heat-treated forging having a hardness of 25-30 Rockwell C. Six such units are used

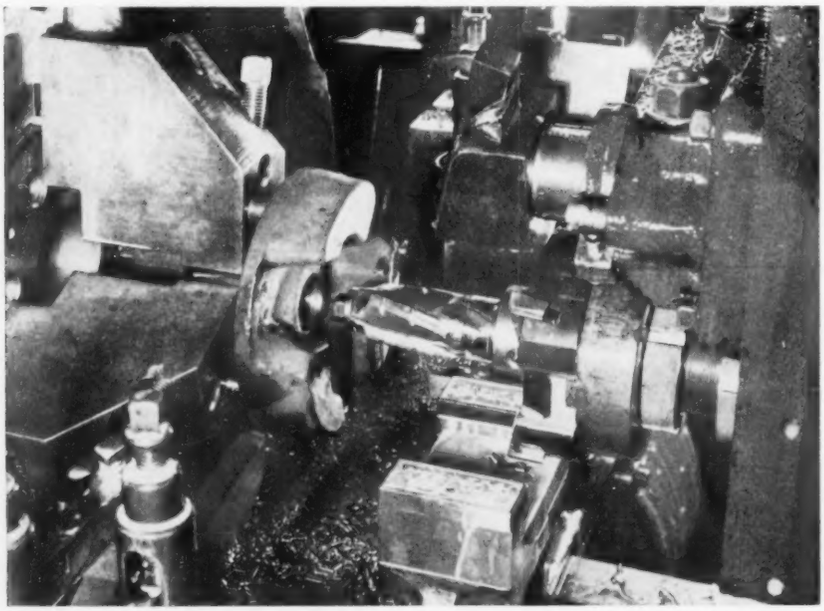


Fig. 2—All boring, turning facing and chamfering operations are performed on differential cases with standard tools prior to milling and drilling

While the number of different parts that go into the assembly of a truck is quite large, the quantity of each part needed is relatively small. Hence it is necessary to employ general-purpose tools for machining and to limit the expenditure for special tooling in order to hold capital investment to a reasonable value. Frequent changes in set up are necessary because of the diversity of parts ma-

chined. Frame side rails, which necessarily differ considerably in trucks of different wheel base and for different applications, are made up from rolled sections in a separate department where there are a number of drill presses, the only machine tools required.

Equipment in the machine shop includes lathes, horizontal and vertical milling machines, turret lathes, boring mills, radial drills and drill presses, shapers, grinders and some miscellaneous equipment. About the only tool usually classed as high-production equipment is a Potter & Johnston turret lathe which is employed primarily for machining flanged hub differential cases. Six of these units are used in each truck and they involve some relatively heavy machining operations. These forgings are made in two different diameters and with hubs of different lengths, but that shown in Fig. 1 is typical.

These S.A.E. X-1340 manganese steel forgings are received in heat-treated form having a Rockwell C hardness of 25-30. The central hole is rough bored before the piece is chucked in the Potter & Johnston for subsequent boring and turning operations as shown in Fig. 2. In the initial operation, the hole is bored

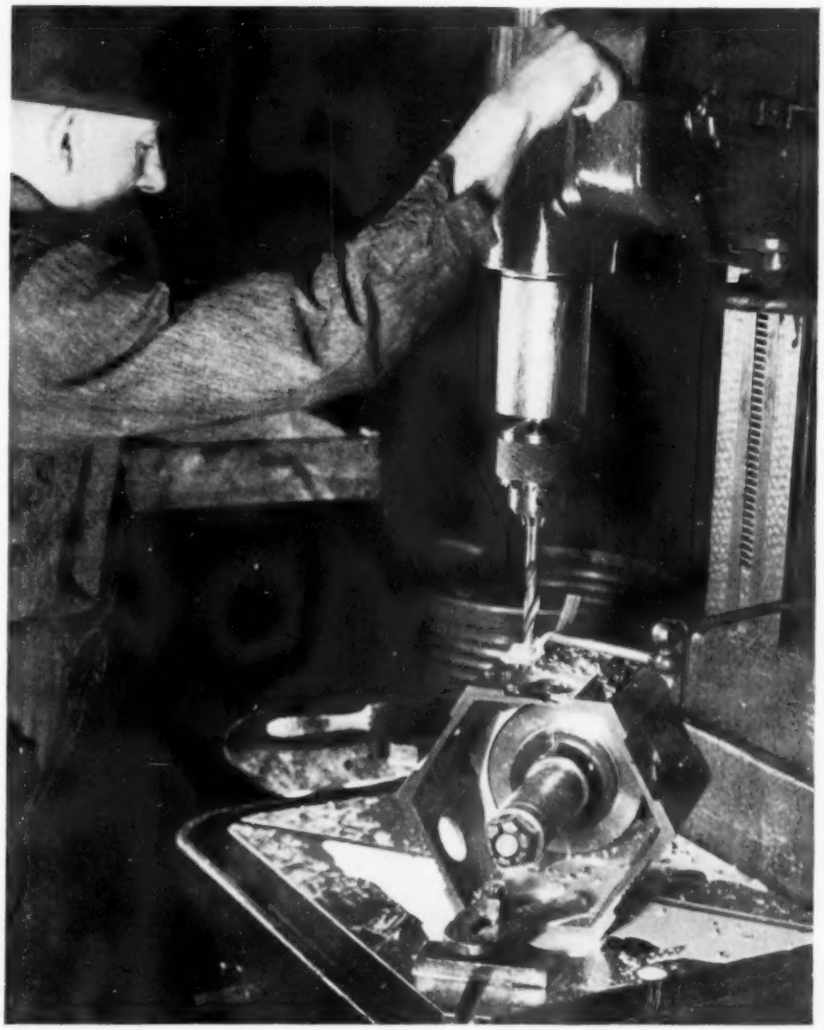


Fig. 3—Transverse holes are located in forged differential cases with this hexagon-shaped jig. Three such holes are drilled and reamed in each piece

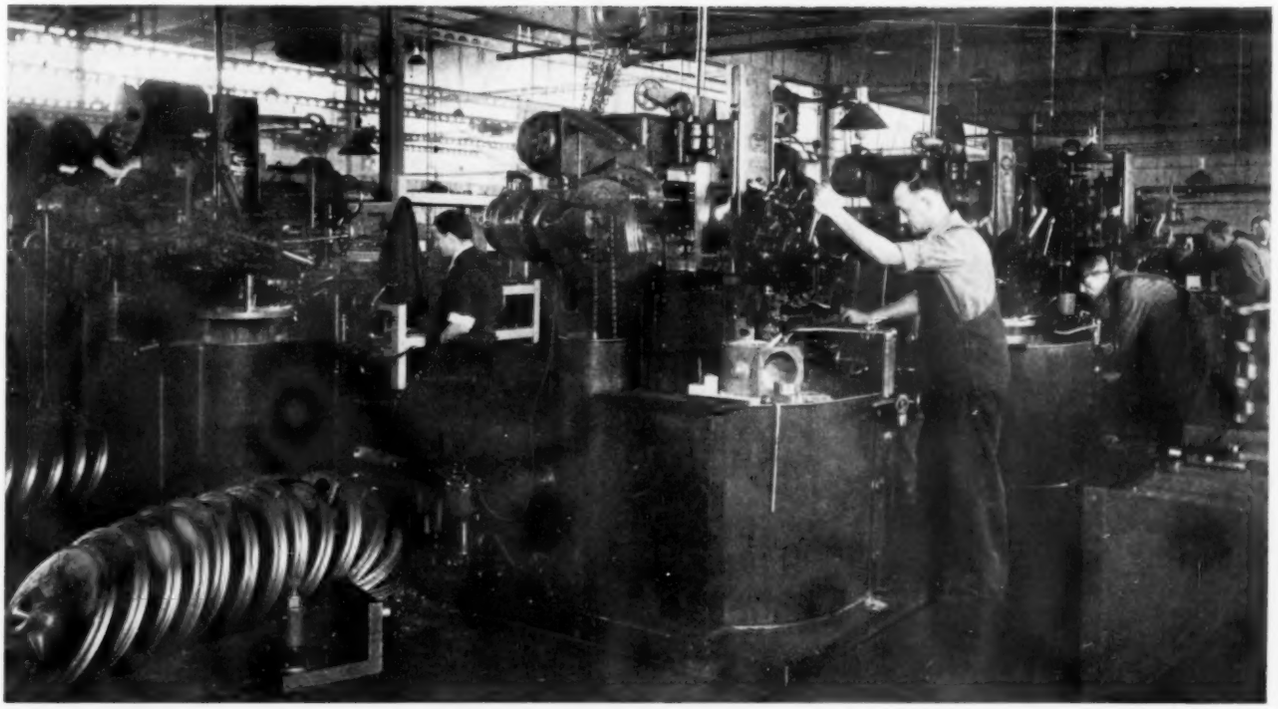


Fig. 4—Side-head mills are used for machining a wide variety of parts. Standard tools are used wherever possible because of low manufacturing quantities

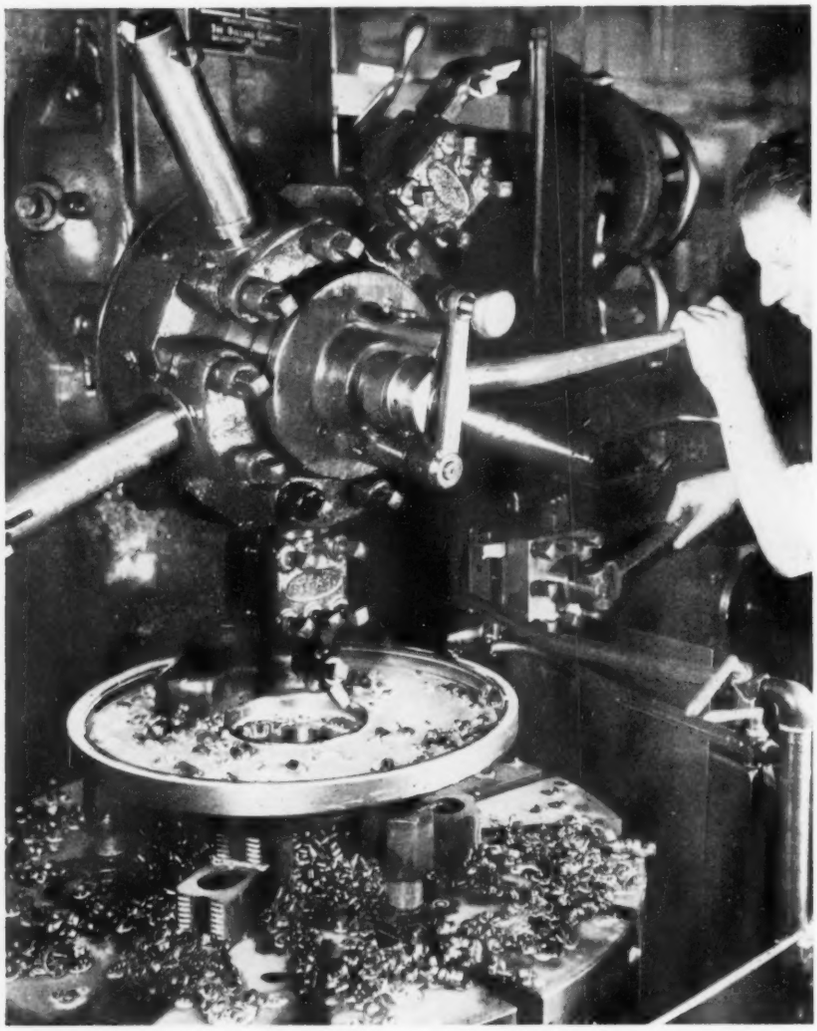


Fig. 5—This cast-steel rear-wheel housing is machined complete, except for a few milling and drilling operations, on a Bullard side-head mill equipped with standard turning and boring tools

with a shell drill, the projecting ends or lugs of the flange are rough faced and the outside diameter is rough turned and chamfered. Next, a second roughing cut is taken in the bore and the hub end is rough faced. This is followed in the third operation by a second rough cut on the ends of lugs and a second cut on the end of the hub. In the fourth operation the faces of the lugs, which are recessed by the facing in prior operations, are finished and an edge is beveled. Finally, in the fifth operation, the bore is reamed and the inside diameter of the lip on the lugs is finish bored. Approximately 22 min. is required for this cycle of operations.

Later, with a different tooling setup on the same machine, the following operations are performed on the piece: (1) rough face back of flange, turn the diameter of the boss back of flange and turn hub diameter; (2) finish turn hub and boss diameters; (3) finish turn back of flange and turn three chamfers. Time for this cycle is 8 min. Several holes have to be drilled parallel to the axis and three cross holes must be drilled and reamed. This is done in a drill press using the hexagonal box jig shown in Fig. 3. This jig is turned successively onto three alternate faces to bring the holes at the required angle.

Many of the operations necessary on such castings as wheel housings, transmission end covers, wheel hubs and brake drums are performed in the Bullard side-head mills shown in Fig. 4. These machines, together with the rest of the machine tools except those used in the frame assembly group, are located in a low bay at one side of the large bay in which the trucks are assembled. Other portions of this low bay are given over to the manufacture of unit assemblies and a paint room for finishing certain parts and the assembled units. On the other side of the building is another low bay in which are located raw material and finished part stockrooms. One end of the large center bay is used for frame assembly.

One of the numerous parts machined on the Bullards is seen in Fig. 5. Here a 21 7/16-in. diameter cast-steel rear wheel housing is put through the following sequence of operation: (1) rough hole and face end of hub; (2) rough turn outside diameter; (3) bore large inside and bearing diameters; (4) undercut inside radius at rim; (5) turn inside corner at bearing and make finish cut on top face; (6) finish outside diameter and finish bore for bearing;

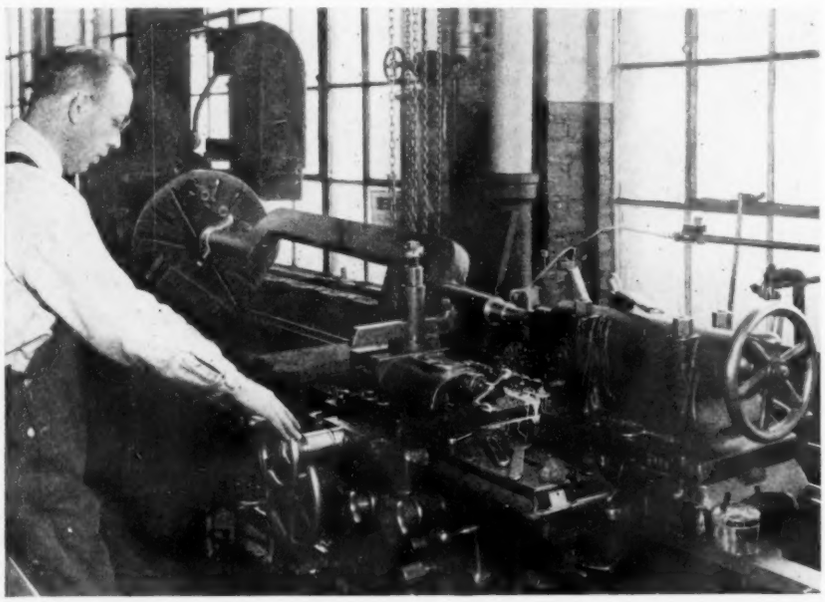


Fig. 6—Rear-axle shafts are forged from 3½ per cent nickel steel, heat-treated, then delivered to the machine shop. Here, each end is turned and ground with a 1½ deg. camber

Fig. 7—Main assembly bay, showing a number of heavy-duty, four-wheel-drive trucks in various stages of assembly. Frames are sub-assembled in a space in the background, while the machine shop, sub-assembly groups, paint room and stock rooms are located in low bays on either side of this main aisle

(7) rebore hole and round top face of rim; (8) ream hub hole to size; (9) cut groove in outside diameter and right and left thread at each side of same; (10) cut clearance on projection; (11) polish top face of rim and remove burr on thread; (12) turn piece over and face end of hub; (13) cut fillet on end of bore. Subsequent operations on a milling machine and a drill press finish the housing. Front wheel housings are similar in many respects, but require additional operations for the king pin and adjacent parts.

Among the many other interesting machining jobs done in this shop, is that of turning the ends of the rear axle. This is a heavy heat-treated 3½ per cent nickel steel forging having a total length of 77 in. Machining each end is a relatively simple turning job which is done in a Lodge & Shipley engine lathe. Specifications call for the axes of the wheel spindles to be given a 1½ deg. camber, that is, instead of having a common axis the respective axes are tilted 1½ deg. to the horizontal. From a machining angle, the simplest way of proceeding would be to turn the spindles with the same axis and then bend the axle. However, since it would be very difficult to hold the angle to the required accuracy in any attempt to bend this heavy axle, one end is attached to the face plate 2 in. off center and the outer end, supported on the tail stock center as shown in Fig. 6, is then turned to the required diameters. Next, the axle is changed end for end and the other end similarly machined. This provides a simple and positive control of the camber angle and meets all other requirements. A counterweight on the face is used to provide a balance for the offset of the axle and prevent vibration. A somewhat similar setup is employed when the bearing diameters are finished ground to size.

Most of the machinists have been with the company for many years and well understand what is required of them as to precision in the work turned out. In general, assembly follows closely after the actual production of the parts and any lack of fit is soon discovered and corrected. Adequate gages are supplied where needed and the workmen are held responsible for maintaining required dimensional limits. This makes any elaborate system of inspection unnecessary. Machinists, as well as the mechanics doing assembly work near by, are paid on a piecework basis and if a lack of proper fit interferes with assembly those responsible hear about it promptly. The net result is a shop which works smoothly and turns out a quality product at reasonable cost, considering the scale of production necessary in a product having a somewhat limited market.

"Averaging" Ages of Machine Equipment

AVERAGES and percentages can play havoc with costs and efficiency unless we realize just what they mean. The Navy, for example, has a sort of unwritten rule that heavy machines such as gun lathes, large planers and boring mills and the like, have a useful life of 30 years. Medium sized machines are rated as 20 years with light machines at 15 years.

Considering the Navy as the gigantic jobbing industry that it is, these figures seem rather reasonable. But the applecart gets a complete upset when we learn that in reality they are lumped under a 15-year *average* which changes the picture completely.

This means that to maintain this 15-year average some machines must be *30 years old* for each new machine installed. If replacement of small machines is made every 15 years, as first stated, some of the heavy machines must become museum pieces before they can be replaced.

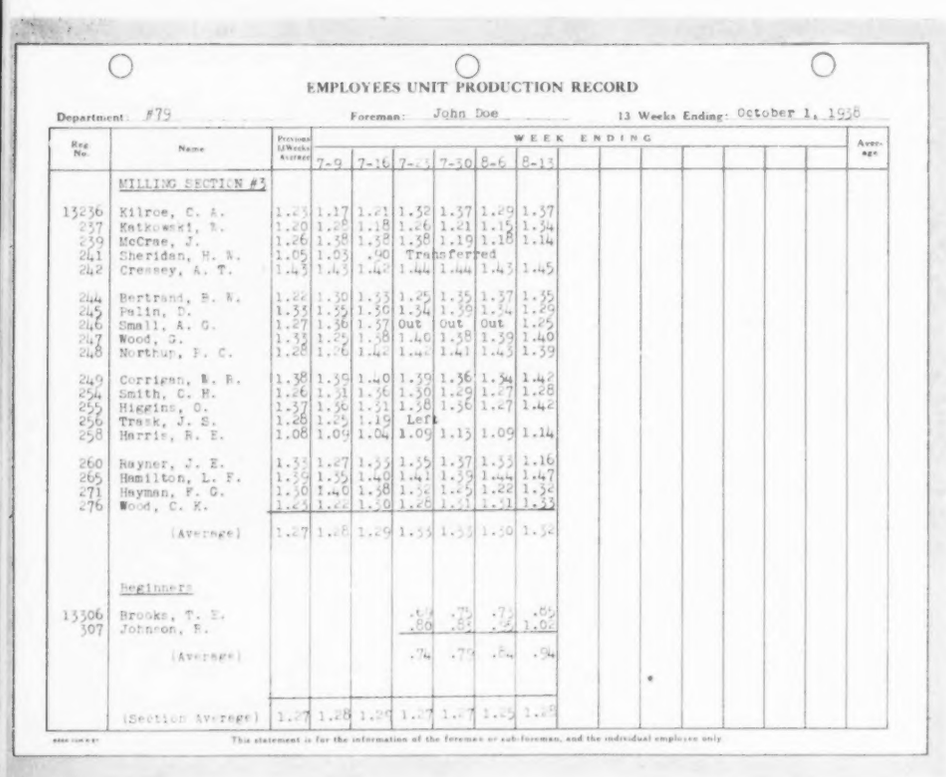
The usefulness of any machine must be judged by its efficiency on the job as compared with newer equipment and by its cost of maintenance, rather than by its age in years.

While there are too many private shops with inefficient equipment, only a few reach the 15-year average of the Navy. The sooner enough Navy money is earmarked for new enough shop equipment to greatly reduce this *average* life of 15 years, the better for us all.

An Incentive Plan All Can Understand

Brown & Sharpe's method of rewarding efficient workers is flexible enough to take care of older employees, adaptable enough to cover unforeseen contingencies

BURNHAM FINNEY
Editor, American Machinist



EMPLOYEES UNIT PRODUCTION RECORD

Department: #79 Foreman: John Doe 13 Weeks Ending: October 1, 1938

Reg. No.	Name	Previous 13 Weeks Average	WEEK ENDING 7-9	7-16	7-23	7-30	8-6	8-13	Average
	MILLING SECTION #3								
13236	Kilroe, C. A.	1.23	1.17	1.21	1.32	1.37	1.29	1.37	
237	Katkowski, R.	1.20	1.28	1.18	1.26	1.21	1.15	1.34	
239	McCrae, J.	1.26	1.38	1.38	1.38	1.19	1.18	1.14	
241	Sheridan, H. N.	1.05	1.05	.90	Transferred				
242	Cressey, A. T.	1.43	1.43	1.42	1.44	1.44	1.43	1.45	
244	Bertrand, E. N.	1.22	1.30	1.33	1.25	1.35	1.37	1.35	
245	Palin, D.	1.33	1.35	1.30	1.34	1.38	1.34	1.29	
246	Small, A. G.	1.27	1.36	1.37	Out	Out	Out	1.05	
247	Wood, G.	1.33	1.25	1.38	1.40	1.38	1.39	1.40	
248	Northup, F. C.	1.28	1.36	1.42	1.42	1.41	1.43	1.39	
249	Corrigan, R. R.	1.38	1.39	1.40	1.39	1.36	1.34	1.42	
254	Smith, C. H.	1.26	1.31	1.36	1.30	1.29	1.27	1.28	
255	Higgins, O.	1.37	1.30	1.31	1.38	1.36	1.27	1.42	
256	Trask, J. S.	1.28	1.25	1.19	Left				
258	Harris, R. E.	1.08	1.09	1.04	1.09	1.13	1.09	1.14	
260	Rayner, J. E.	1.33	1.27	1.33	1.35	1.37	1.33	1.16	
265	Hamilton, L. F.	1.33	1.35	1.40	1.41	1.39	1.44	1.47	
271	Hayman, F. G.	1.30	1.40	1.38	1.36	1.25	1.22	1.36	
276	Wood, C. K.	1.24	1.28	1.30	1.28	1.31	1.31	1.33	
	(Average)	1.27	1.28	1.29	1.35	1.33	1.30	1.32	
	Beginners								
13306	Brooks, T. E.				.68	.75	.72	.89	
307	Johnson, E.				.80	.87	.96	1.02	
	(Average)				.74	.79	.84	.94	
	(Section Average)	1.27	1.28	1.29	1.27	1.27	1.25	1.28	

This statement is for the information of the foreman or sub-foreman, and the individual employee only

The Employees' Unit Production Record is particularly valuable to foremen and sub-foremen in determining the men in the department who for some reason require help from supervisors

A WAGE INCENTIVE plan which has worked successfully over a period of years is in operation at the plant of Brown & Sharpe Mfg. Co., Providence, R. I. It is a plan originated by the company and is free from the usual intricacies of most wage incentive plans. The ease with which the worker can understand it and with which he can figure his earnings is one of its most commendable features.

Fairness in its administration is another factor contributing to its success. Still another reason why the plan has proved satisfactory is that it is based on a sound rate setting policy in which the workers have confidence. If an operator complains about his earnings, his complaint is immediately considered and action taken.

Care has been taken to eliminate weaknesses found in many other wage incentive plans. For one thing, men of considerable versatility and of exceptional skill are specially rewarded. Provision also is made for the older, less efficient employee so that he is adequately compensated without penalizing a department's costs.

Actually the wage incentive plan is a production control plan for controlling direct and indirect labor costs. It provides a common unit for measuring the output of individual workers. This unit is the "unit hour" which is a unit of work equal to the amount of good work that an experienced operator working at an average piece work rate of speed will produce in .83 of an hour, including time for rest. On this basis an experienced operator working at an average piece work rate of speed will produce 1.2 unit hours of work per hour. A production of 1.0 unit hours per hour pays the operator his hourly base rate of pay, and any production over this proportionately increases his earnings.

In other words, the wage payment plan is a piece work plan which pays the worker in direct proportion to his output, piece work prices being expressed as so many unit hours per piece instead of as so much money per piece. For each unit hour produced by the operator, he is paid his hourly base rate. In order to determine his earnings, he merely has to multiply the unit hours credited to him, by his hourly base rate.

Hourly base rates for experienced operators have been established for all classes of direct labor work in

Time Cards are duplicated from the same master used in making the Route Sheet and the Check Sheet which reduces clerical errors when posting to the Check Sheets

The Weekly Labor Report is intended primarily to give the department foremen and management an up-to-date record of the cost trend and to disclose high costs promptly so that losses may be kept to a minimum

WEEKLY LABOR REPORT

DEPARTMENT #79 FOREMAN John Doe 13 WEEKS ENDING October 1, 1938

WEEK ENDING	TOTAL DIRECT AND INDIRECT LABOR	DIRECT LABOR: ACTUAL HOURS ON BONUS	DIRECT LABOR: UNIT HOURS ON BONUS	UNIT HOURS PAID FOR REWORK AND ALLOWANCES	UNIT HOURS PAID FOR SPOILED WORK	% ON BONUS OF TOTAL DIRECT	UNIT PRODUCTION: WORKERS ON BONUS	UNIT PRODUCTION: INDIRECT LABOR 16 BUDGET	UNIT PRODUCTION: DEPT.	EXTRA HOURS ON DESIGN CHANGES	ACTUAL HOURS PER NET UNIT HOUR PRODUCED: DIRECT LABOR .810	INDIRECT LABOR .160	INSPECTION .100	WAGE INCENTIVE .025	TOTAL COLUMNS 12 13 14 15 16 17 1.095
WEEKLY AVERAGE PREVIOUS 13 WEEKS	8896	7234	9036	250	2	96	1.25	1.22	1.27	15	.829	.155	.100	.027	1.111
7-9	7429	6013	7554	172	8	97	1.26	1.18	1.26	51	.820	.160	.107	.030	1.117
7-16	7100	5677	7242	200	13	96	1.28	1.14	1.26	22	.814	.164	.111	.028	1.117
7-23	7382	6115	7647	109	9	97	1.25	1.29	1.28	31	.816	.143	.108	.025	1.092
7-30	6915	5726	7638	141	14	97	1.33	1.30	1.35	41	.770	.135	.115	.025	1.043
8-6	6048	4940	6434	110	7	96	1.30	1.28	1.32	14	.789	.140	.127	.023	1.079
8-13	5240	4210	5715	132	0	94	1.36	1.30	1.37	10	.765	.132	.124	.024	1.045
WEEKLY AVERAGE ABOVE 13 WEEKS															

HIGH DEPT. UNIT PRODUCTION IS OBTAINED BY
(1) KEEPING THE UNIT HOURS PAID FOR REWORK, ALLOWANCES AND SPOILED WORK DOWN TO A MINIMUM
(2) MAINTAINING A HIGH WORKERS' UNIT PRODUCTION
(3) AND BY MAINTAINING A HIGH INDIRECT LABOR UNIT PRODUCTION

DEPT. FACTOR .05

* Budget effective week ending July 9, 1938.

the factory, and each worker is assigned an hourly base rate according to the class of work he performs.

Special provision is made for rewarding men of exceptional skill and versatility who are called upon to do out of the ordinary jobs, by assigning to these employees an hourly base rate higher than that called for by the particular class of work performed.

Although an experienced operator working at an average piece work rate of speed will produce 1.2 unit hours of work per hour, thereby earning 20% over and above his hourly base rate, operators of unusual skill will produce considerably more than this and their earnings will be proportionately higher. No restriction is placed on output providing the quality is satisfactory. In each case the unit hours allowed for performing an operation are based on first class work, and only good work is paid for unless spoilage is beyond the worker's control.

The plan guarantees each worker his hourly base rate of pay on a weekly basis, and also provides a method whereby the foreman may grant allowances in addition to the regular piece work prices for conditions beyond the control of the workers.

The plan is applied to direct productive operations but there are jobs, amounting to a small portion of the work, which are considered not practical to measure on a unit hour basis. This is termed "off bonus" work or "day work" and is ordinarily paid for at a straight hourly base rate. However, provision is made for compensating a worker of above average skill working on an "off bonus" job so that he may earn more than his hourly base rate by assigning a special hourly rate for the particular "off bonus" job. This is referred to as a "temporary job rate" and is ordinarily determined by taking 90 per cent of the previous four weeks average piece work earnings.

As "on bonus" work (piece work) is completed, individual workers are credited on their time cards with the unit hours of work produced. These time cards are sent to the timekeeper's office where the records are computed weekly. The totals form the basis for measuring the performance of each worker and of each department as a whole. So that the unit hours credited to the worker will be a fair basis for measuring production and for wage payment, allowances expressed in unit hours are granted for doing necessary extra work caused by conditions beyond his control. These allowances are made out on red cards and the worker is properly credited. They are then charged against the department responsible.

An "Employees' Unit Production Record" which lists the workers on bonus and shows for each worker his "unit production" for the previous week, is furnished the department

foremen and the sub-foremen each week, several days before payment of the weekly earnings. This record also shows the employees' unit production for each of the preceding weeks in the quarter and his average unit production for the previous quarter. The employees' unit production on bonus is determined by dividing the unit hours on bonus by the actual hours on bonus. This is a convenient figure for judging for production of the individual worker.

Spots Low Productions

The Employees' Unit Production Record is for the information of the foreman or sub-foreman and the individual employee only. The worker who wishes information regarding his performance asks his sub-foreman who has a copy of the unit production record. This record sheet enables the foreman at a glance to tell how one man's performance compares with another's. It is of special value in picking out quickly the men in the department whose productions are low or who need special supervision.

Weekly production for each manufacturing department is expressed in unit hours and is equal to the total unit hours produced by all direct productive workers in the department after deductions have been made for spoilage and for allowances credited to workers for conditions beyond their control. These weekly figures are the basis for the Weekly Labor Report, which is a record of the performance of the total direct and indirect labor in the department.

The Weekly Labor Report gives the department foreman and the management an up-to-the-minute record of the cost trend in each department, disclosing inefficiencies promptly so that losses may be kept at a minimum. The department foreman studies the Weekly Labor Report as soon as it is received and immediately investigates the unfavorable factors. It is his responsibility to take the necessary corrective steps to improve his department efficiency.

There are a number of employees who have been with the company many years and whose production is low because of their advanced age. Wherever a department foreman has such a man in his ranks, he is permitted to charge only a portion of the worker's time to the productive job. The balance is charged to a general expense time number which is considered a part of the company's overhead cost. In this way departmental efficiency measured in labor cost is not penalized, yet older workers are taken care of.

While provisions have been made to offset handicaps for which a department is not responsible, these provisions must all have the approval of the Works Superintendent or his representative. These provisions are made to overcome just handicaps, and not as a method of covering up inefficiencies and poor management in the department.

Much of the wage incentive plan's success depends on the efficiency of the Wage Incentive Department. Fair time standards must be established. The rank and file of employees must have confidence in the time study men and in their qualifications for their jobs. The Wage Incentive Department insists that every time study man shall have actual machine shop experience before he can qualify for time study work. It also insists that the men be sympathetic to the worker's point of view. The time study men must be open-minded and must give serious consideration to all complaints, whether justified or not.

Complaints Adjusted Promptly

If an operator is dissatisfied with his earnings, possibly because he thinks an error has been made in setting the time for a certain job, he can go immediately to his foreman and lodge a protest. The foreman will call in the time study man involved and the three will talk over the matter. Usually little time elapses before such complaints are adjusted to the satisfaction of everyone concerned.

In the installation of the wage incentive plan and in its administration, it has been constantly kept in mind that the foreman is the key man to success or failure. In each department, the foreman has followed the installation step by step and has worked with the time study engineer in perfecting the details for his department. With this background, the foreman has a thorough knowledge of the operation of the entire plan, and having satisfied himself as to its value and fairness to all parties concerned, he is in a position to effectively operate the plan in his department and to pass his confidence along to his sub-foremen and workers.

Time study tables, based on detailed time studies, have been prepared for most of the machining operations and are used in setting unit hour values. The foremen and the sub-foremen in direct charge of machine operators have helped substantially by working with the time study men in developing these time study tables.

In a plant such as Brown & Sharpe's, which manufactures a wide variety of products, it has been found desirable and profitable to have the detailed instruction cards prepared by a central department. Instruction cards are usually made out by the time study section of the Wage Incentive Department and are filed in each department for the work done there. They are given to the operator when he is assigned a job. These cards give necessary instructions for getting a job done in minimum time including required feeds and speeds on machining operations, and any unusual specifications regarding quality. They also show the unit hours (piece work prices) for the operation, a description of the operation, the part description of the operation, the part description and part number, kind of machine, and the number of machines that are to be run by one operator.

The unit hours allowed each operation for each part are indicated on a Master Route Card which is filed in the Production Control Department. When an order is released, a duplicator master is made of the Master Route Card with the specified dates for starting each operation. From this duplicator master the Route Sheet (manufacturing order) which lists all operations on a job and the unit hours allowed each operation, the Check Sheet, and the worker's time cards are made out at the same time on a duplicating machine. The time cards, blue print of the job, and Route Sheet go with the work through the shop.

The Check Sheets are kept in the Production Control Department for centrally controlling the piece counts and piece prices and for following the progress of all orders through the shop. All time cards for completed operations are posted against the corresponding operations on the Check Sheets. No time cards are accepted unless the piece counts and unit hour prices correspond to that on the Check Sheets. This checking procedure is especially important since the proper functioning of the entire plan for controlling direct and indirect labor costs depends on an accurate accounting of the piece counts and piece prices credited to the individual workers.

In conclusion, emphasis should be put on the vital part played by fair and impartial administration in making this wage incentive plan a success. It has worked out so admirably because everybody connected with it, from the management down to the sub-foremen, has had full justice to the workers constantly in mind.

DAD SAYS

Man Can't Live by Bread Alone

IT'S FUNNY, ain't it, how the things your mother used to say come back to you and you begin to see what she was talkin' about. Take this one, "Man can't live by bread alone." She was always fittin' that into some talk she would be havin' with us kids, but it's only lately I begin to see what she was meanin' by it.

Take Schmitty over in Plant A. Anyone who knows Schmitty knows he ain't one of the beer drinkin' kind. Never hangs around much—not even on pay days. One day I asked him what fun he got out of life and he said he didn't have time to hang around much as he always had some tinkerin' to do around home. Said he wanted to be an inventor, and that sounds pretty high falutin'.

Well, I've known Schmitty ever since he started over in Plant A and he never seemed to be enjoyin' life much—always did his work, I guess; but it got so the fellows were callin' him "sour puss" and I heard one of the foremen say he thought he was a trouble-maker.

Well, the other day I was over there hangin' a motor and Schmitty was as busy as a bee, smilin' and talkin' a mile a minute to his new foreman. Well, after the foreman left I went over to Schmitty and asked him what it was all about and he told me.

Seems he's been workin' at home now for some time on a new way to machine those bearings, but he never could get his old foreman interested. Now when this new foreman came in he didn't know much about machining bearings and so got all "hept up" about Schmitty's idea. He had one of the fellows from the drafting room make some sketches and then the toolroom made up Schmitty's idea of a new jig. Say, it worked —not just right at first, but with some changes it sure was the berries.

Well, Schmitty told me they were goin' to change over all the machines to his idea and call it the "Schmitt jig." It ain't hard to see then why Schmitty is feelin' so good.

As I was sayin', I'm beginnin' to see what Ma was meanin' when she said, "Man can't live by bread alone."

A Shop for Sprockets

Morse Chain selects new equipment from the tool to the complete machine to gain flexibility in its sprocket set-ups

JOHN HAYDOCK
Managing Editor, American Machinist

PRECISION PARTS run into astronomical figures when it comes to silent chain. If an automobile manufacturer uses 100,000 chains a month, and each chain contains 400 components (links, pins and bushings) the total is 40,000,000 pieces for a single month's output. The normal production of the Morse Chain Company runs considerably higher than this and to it must be added the equally exacting requirements for power and roller chain.

An automotive chain is held to a 0.010-in. tolerance in its entire length. As any error may be cumulative it is readily seen that each piece in it must be kept to extremely close limits. Such accuracy can be maintained only through the use of up-to-date equipment, so this company makes it a policy to keep in touch with new developments in the metal-working field and to install new units whenever their acquisition is justified.

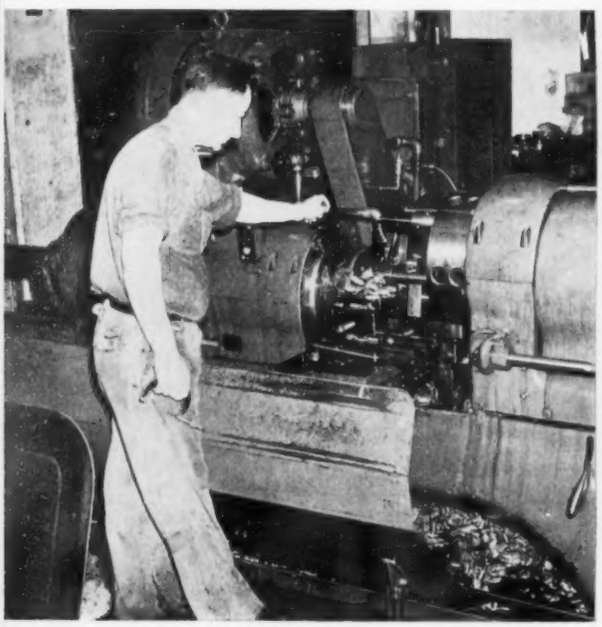
The business of making chain transmissions is a curious combination of mass production and job shop manufacture. For the automotive chains which are turned out by the thousands, automatic machinery has been installed. Machines stack the links on double wires in the correct position while another type assembles these links with hopper fed pins to produce the complete chains ready for riveting. Other chains on which the runs are short must be hand assembled. Practically all of the chain making machinery is special, home designed and home built.

In the sprocket department, however, standard equipment is employed. There are so many variables in diameter, bore, pitch and width that special machinery is out of the question. But just as the chain making machinery is in a continual state of development, sprocket making methods are kept modern.

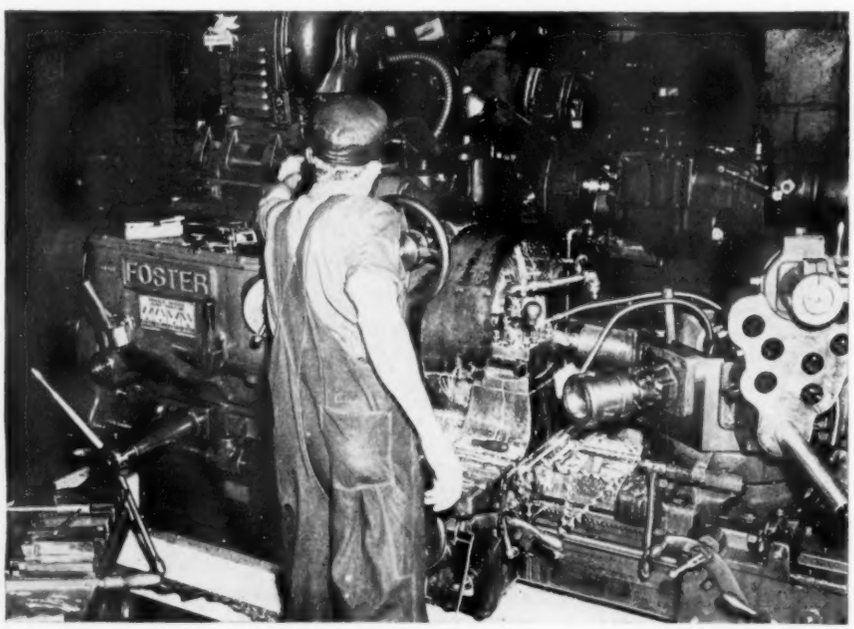
During the past year the following new equipment was installed:

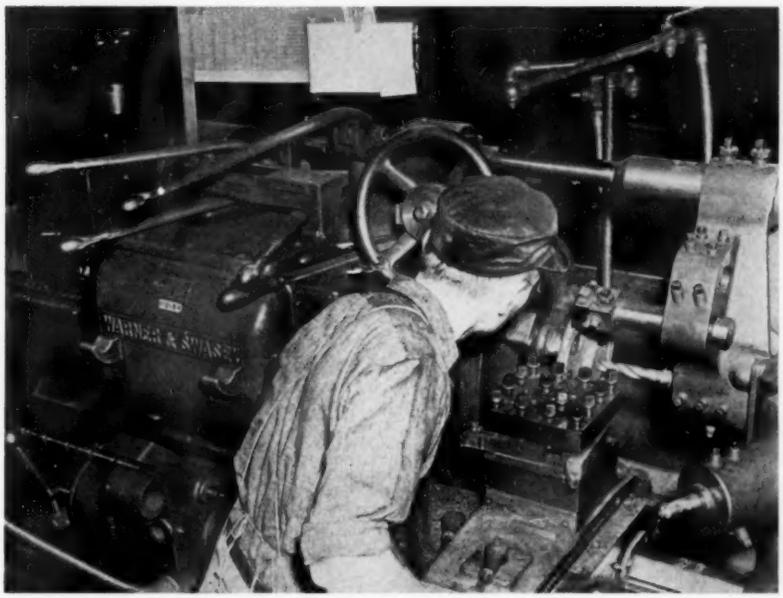
2—Heald hydraulic internal grinders (15 in. and 24 in.)
1—Cincinnati 12x18-in. plunge-cut cylindrical grinder
1—Norton universal tool and cutter grinder
1—King three-head 52-in. vertical boring mill
1—Warner & Swasey 3A turret lathe
3—Foster turret lathes (one 2B and two 3B)
1—Brown & Sharpe $\frac{7}{8}$-in. automatic lathe
1—Cleveland Automatic $4\frac{1}{2}$-in. lathe.
2—Seneca twin-spindle drill presses
1—Allen twin-spindle drilling and tapping machine

A Cleveland automatic lathe improves the turning time on work machined from bar stock

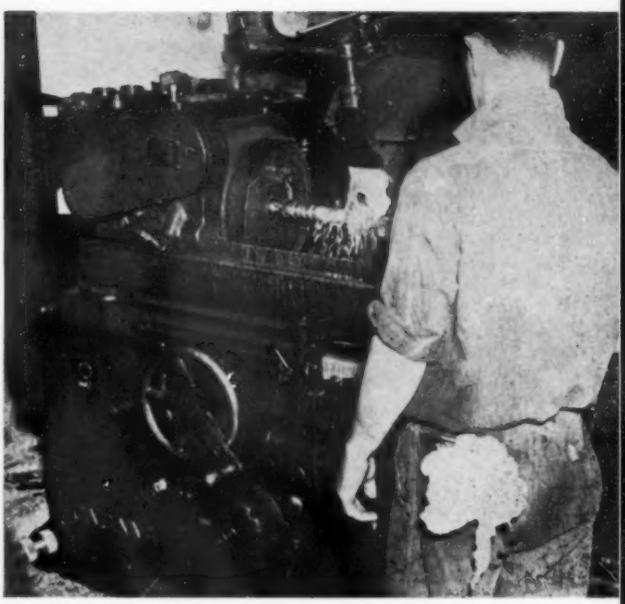


Steel sprockets are machined on one of three Foster lathes equipped with cobalt high-speed steel tools





A Warner & Swasey turret lathe uses Stellite tools to turn out cast iron sprockets



Hubs are ground on sprockets and aluminum clutch cases on a Cincinnati plunge-cut machine

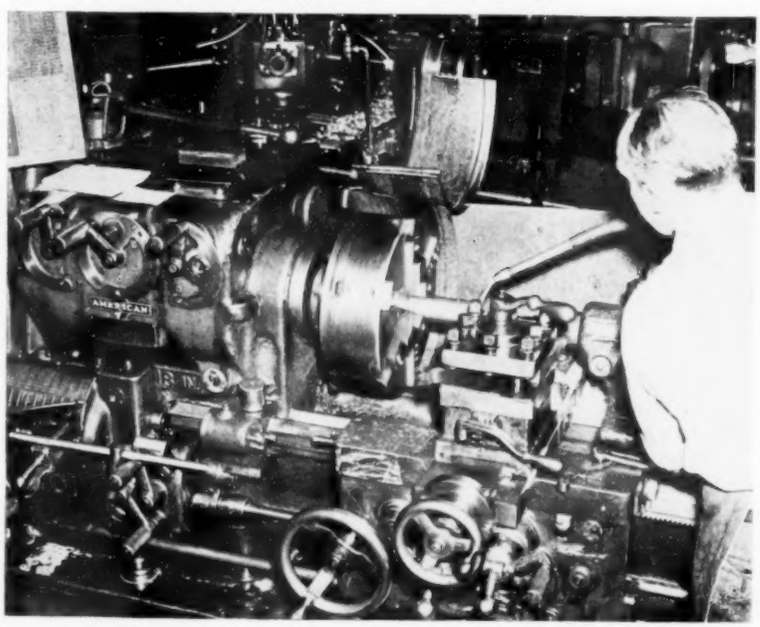
1—La Pointe broaching machine
3—American heavy duty engine lathes (One 16 and two 18 in.)
1—Sunnen honing machine
1—Productomatic 10-in. gear miller
3—Newark 48-in. gear cutting machines
1—Newark 90-in. gear cutting machine
1—Do-All sawing and filing machine
1—Hardinge Bros. Cataract bench lathe
1—Gustav Wagner cold saw
1—Wagner special saw tooth grinder
1—U. S. Machine Tool hand milling machine

While all of the units mentioned are general purpose machines they were selected in reference to the particular class of work on which they are being used. The machines were not considered alone but in connection with the tools and cutting lubricants that would be used on them.

The Morse Chain Company extensively employs the new cutting materials—tungsten carbide, tantalum carbide, stellite and cobalt high-speed steel—adapting each to locations where best use can be made of its particular qualifications.

It is not possible to describe all the wide variety of work that goes on these new units, but a few examples will be given to indicate the careful planning behind each job.

Second turning operations are done on an American heavy duty lathe equipped with a turret tool post



The Do-All sawing and filing machine is used in roughing out contours on punches and dies used in the manufacture of chain. It saves 50 per cent of the roughing time. With the number of punchings required each month for automobile chain, punches and dies are relatively short lived, and are manufactured on a routine production basis.

The Hardinge bench lathe, equipped with standard attachments and special face plate fixtures, is an important tool in the accurate and efficient manufacture of these link punches and dies.

One of the jobs on the Cleveland automatics is the making of roller chain sprockets from a 3½-in. bar of SAE 1035 steel. High cobalt, high-speed steel tools are used with a high pressure sulphurized cutting oil. A cutting speed of 160 ft. per min. is maintained.

When the number of units to be made warrants, a double form tool set-up is employed which completes two units with each feed of the stock. This set-up, on the sprocket mentioned above, has cut the turning time from fourteen minutes to three minutes per unit.

Pins for special roller chain are made on the new Brown & Sharpe automatic which is of the high-speed type. This machine is also equipped with cobalt H. S. tools and has a six-second cycle on SAE 4620 stock. Methods previously used turned out only 60 pieces an hour.

The ends of these same pins are machined by form tools on the U. S

Machine Tool Company hand miller. Midwest cutters are used on which three steps are held within 0.001 in. of each other.

Stock steel sprockets are made up with minimum bore sizes which must be enlarged to meet customers' specifications. A heavy duty 16-in. American engine lathe equipped with a turret toolpost does this work. It turns out heat-treated SAE 1035 steel at a surface speed of 250 ft. per min.

The bores of coupling hubs are held to a 0.0005-in. limit. This accuracy is attained by honing the work on the Sunnen machine after it is bored.

The Allen double-spindle machine drills and taps sprocket setscrew holes. With quick change collets it cuts in half the time of a former method which used a separate tapping head.

The Seneca twin spindle machines are employed largely for drilling bolt holes in aluminum coupling covers which range in size up to 24 in. The two spindles make it possible to drill the shouldered hole for the body-fit head and shank of the bolt without changing tools.

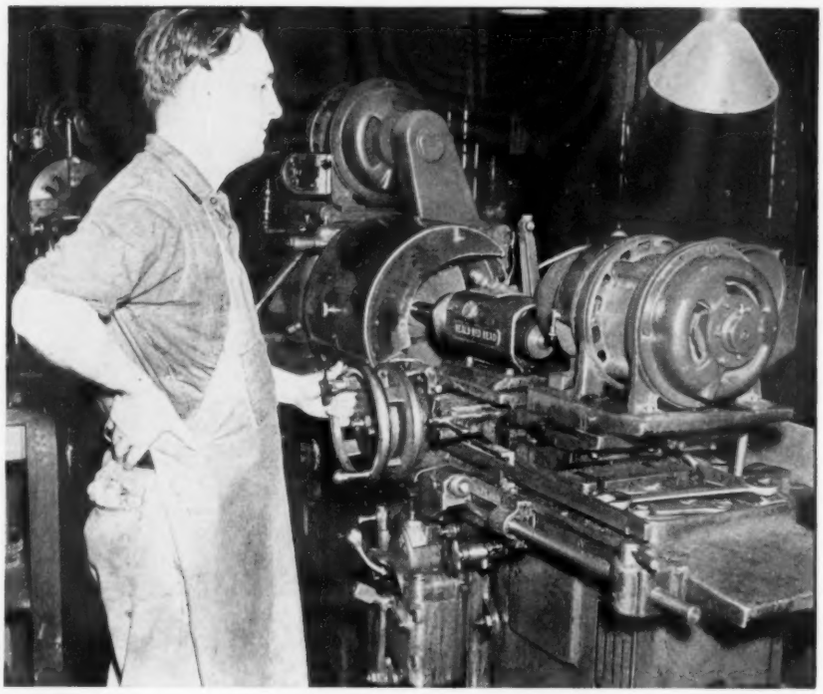
This shop is a recent convert to centralized tool grinding in a crib devoted to this purpose. The Norton universal grinder performs much of this work. In the same crib is installed the Wagner saw tool grinder which automatically completes all faces of each tooth with great precision.

The Wagner cold saw is capable of cutting a 5-in. bar in 1½ min., an operation that formerly took 20 min. on old equipment. The saw blade cuts upward keeping the pressure of the cutting head down on the ways to eliminate chatter.

Cast iron sprockets are machined on the 3A Warner & Swasey turret lathe. This machine is tooled with Stellite J metal except for the drills and reamers. Since drilling is done while outside operations are in progress the surface speed of the O.D. is the limiting factor.

The Foster turret lathes are employed on cast iron and steel sprockets. All are equipped with Foster Barker mechanical three-jaw chucks. The latest machine has hydraulic feed and speed changes. Stellite J tools are used for cast iron and cobalt high-speed steel for steel sprockets. The turret lathes are supplied with a soluble cutting oil.

Second operations on the work coming from the three Fosters and one Warner & Swasey are performed on the two 18-in. American heavy duty engine lathes which are conveniently located between the turret lathes. Stellite 2400 is used on the second operation on C.I. and cobalt high speed steel on steel.



Two new Heald grinders finish the bores on all hardened steel sprockets

Hubs on the aluminum coupling cases which must be held to 0.001 in. are sized on the Cincinnati plunge cut grinder. This work which is completed in 4 min., formerly consumed about half an hour.

Large sprockets are machined on the 52-in. King boring mill. Firthite tools on the outside diameter permit running the speed up to 250 surface ft. per min.

The new Newark gear-cutting machines round out the equipment in this department. Sprockets can be cut from ½ to 180 in. in diameter. High-speed steel tools are used.

Bores on all hardened steel sprockets are ground on the two new Heald machines. These machines have hydraulic feed and give a more economical time cycle and a better finish than the methods formerly used.

Graphite on Small Die Castings

IN ASSEMBLIES of small die castings in which the parts have some relative motion in service, there is sometimes an advantage to be gained by applying a dry lubricant, such as graphite. At least one prominent maker of locks in which numerous zinc-alloy die castings are used made it a practice to tumble some of these parts in graphite before the parts were assembled. This accomplished the desired results, so far as lubrication was concerned, but the light deposit of graphite remaining had the disadvantage that it soiled the fingers of operators making assemblies and left finger marks on plated or lacquered external parts.

Means for overcoming this disadvantage were sought and found by using a material called Aquadag, which is a mixture of colloidal graphite with water in which the parts are dipped, many at a time, in wire baskets. Such dipping leaves a thin coating of graphite when the water evaporates, giving the small die castings the desired and somewhat "slippery" feel and still providing the small amount of dry lubricant desired. Important in this instance is the fact that the coating does not rub off readily or soil the fingers of assemblers to such an extent that unsightly finger marks are left on finished surfaces. In addition, only the simplest form of equipment is required and no tumbling is needed.

In another plant, automotive lock parts are treated by dipping in Oildag, colloidal graphite in oil, and are then centrifuged to remove excess oil.

Swiveling Cores for Die-Casting Dies

Altering an old die to provide for cast letters involved a method that might prove handy in other applications

W. M. HALLIDAY
Millsfield, Peterborough, England

RECENTLY we had to supply a large quantity of zinc-base die-cast plates of the type shown in Fig. 1. The plates were rectangular and had an oval hole clear through them; also there was a groove $\frac{3}{32}$ in. deep by 5/8 in. wide cored centrally across the top face. The castings were made in a twin mold of a built-up type commonly employed by die-casting engineers.

The plates originally supplied had plain sides, but later the customer decided to have the firm name and trademark cast along one edge. It was imperative that the letters should not project above the surface of the plates, since the four sides and the tops were to be polished and electro-plated. The letters were to be $\frac{3}{32}$ in. high, cast on a sunken panel $\frac{5}{32}$ in. wide and 2 in. long.

The method finally evolved for forming the letter cores was simple and entirely automatic. It required no drastic alteration to the molds and no special apparatus to be operated by the workman.

So that readers may understand the nature of the alterations and their effects, a brief description of the mold is essential. In Fig. 2 is shown the stationary die plate. The mating piece (not shown) carries fixed cores for forming a hollow recess at the back of each plate, as well as the cores for forming the oval holes. The castings shrink to this latter die member, which is of course the moving part and is withdrawn from the castings upon the opening of the die. The stationary die plate consists of a flat baseplate slotted lengthwise, the width of slot being equal to the length of the castings. Raised tongue pieces form cores for the grooves in the castings. Three flat insertion plates are in the slot, one at each end at *A* and *B* as indicated by dotted lines and a fixed one in the center. These leave two cavities equal in width to that of the finished castings. Sprue holes and runners are located in the fixed plate. Castings were ejected by means of pins attached to a sliding plate guided longitudinally and arranged to operate on the moving die plate attached to the machine

End Plates Slotted

For alteration purposes, the two end plates *A* and *B* were removed and a suitable slot was machined in each, as shown in Fig. 3. The slot passed clear through the edge excepting at the extreme front where a small step *C* was left, which was essential to maintain flash-free edges on the cast plates. The slots in each end plate were identical, but on opposite sides. Fitting into the slots were the lettering cores *D*, one of which is shown in Fig. 4. The face of each core was provided with a

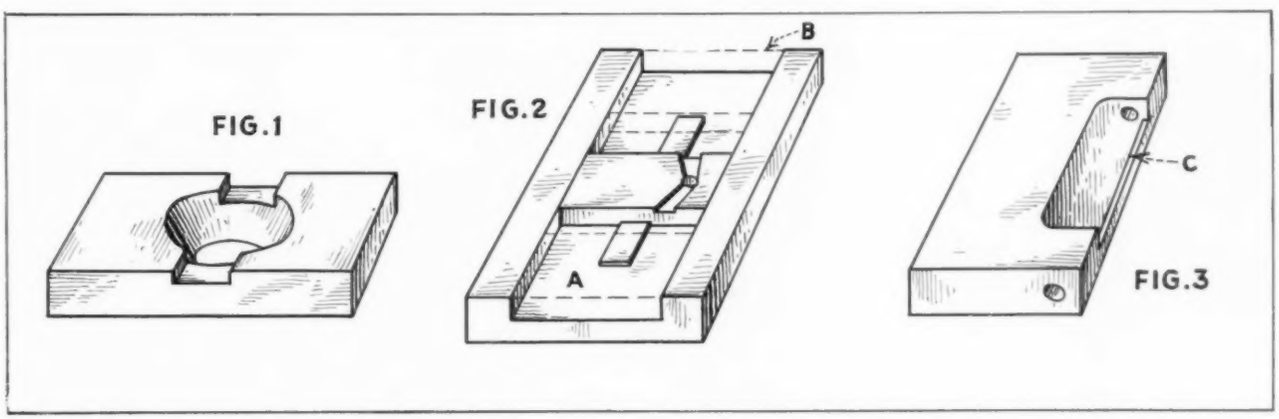


Fig. 1—A sunken panel containing lettering was demanded after the mold had been in use some time. Fig. 2—Loose plates *A* and *B* and the fixed center plate form two mold cavities. Fig. 3—The loose side plates were recessed for rocking cores fulcrumed in the end holes

raised panel and engraving at *F* for the required lettering.

With the cores in position in plates *A* and *B*, Fig. 2, the ends were drilled to receive the fulcrum screws. One of these screws is shown at *H*. The cores were free to swivel a small amount about them. Holes for the fulcrum screws were set well back from the engraved faces of the cores, to enable them to swivel in such a manner that their engraved faces withdrew from the end plates when either core was swiveled a slight amount. Care was taken to make metal-tight joints where the bottom steps of the cores contacted with the stepped portions in plates *A* and *B*. Also suitable means for lubrication were provided.

When a cast has taken place, the dies are opened in normal fashion by the machine mechanism. The castings adhere to the cores on the moving die plate, the adhesion serving to pull them out from the fixed plate. This action also serves to impart a swiveling motion to the letter cores, because of the engagement of

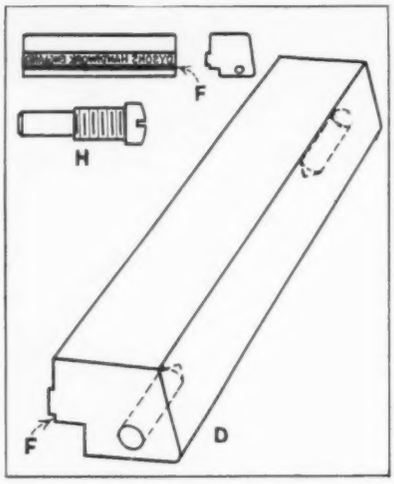


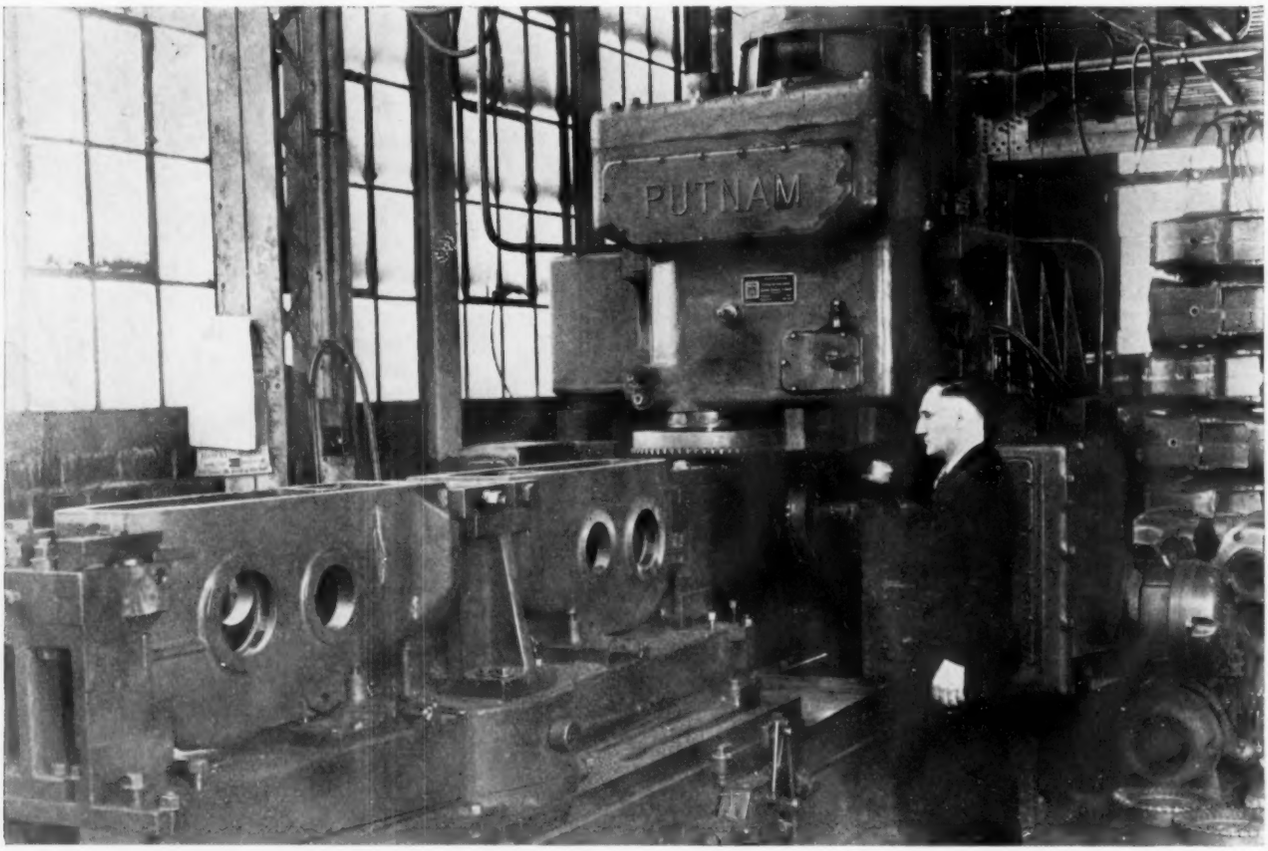
Fig. 4—Each rocking core has a raised panel of lettering

the lettering panels with the castings. Because the cores are fulcrumed well back from the faces, the swiveling motion suffices to withdraw their fronts from the castings. Depth of the cavities in the letters is but 0.012 in. and thus a very small amount of core swivel is required for emergence of the letters on the castings.

When preparation is being made for another cast, the letter cores remain open until the dies are almost closed. Then the parting face of the moving member contacts the upper faces of the letter cores and returns them to casting position. Thus, they are automatically set into position for the next cast.

This modified mold has now been working at a high rate of production (500 castings per hour continuously) and many thousands have been produced. There have been no difficulties in casting nor from marred work. The rate of production is the same as that for plates without the letters.

This type of core operation is simple and will have many similar applications in dies for coring letters or other shallow identification markings. Thus, considerable saving in die design may be experienced where otherwise elaborate mechanisms would have to be introduced to impart requisite core operation.



A Three-Way Operation on a Three-Plow Tractor—The transmission case for Oliver Farm Equipment Company's Model 80 Tractor is first machined on a three-head miller. Castings are mounted on a duplex fixture which permits loading one while another is under cut. Stops, clamps and hold-downs are arranged for easy access and quick control. In this set-up the top is milled, and the sides are rough milled. All cutters are tipped with Stellite and run at 87 surface ft. per min.

Chutes and Magazines for Power Presses

Blanks and shells are transferred to the dies by either manual or automatic devices that give safer and faster operation than by hand feeding

C. W. HINMAN
Tool Engineer
Kobzy Tool & Electric Mfg. Company

A PRESS ROOM may not have modern feeding chutes and slides, but it can use simple manual feeds just as satisfactorily in many cases. With an automatic stop and hand feed, short strips can often be advanced as fast as with a roll feed. The advantages in using a roll feed are obtained when long strips and coiled stock are employed, enabling one operator to tend several machines. For redrawing shells and similar work the operator shown in Fig. 10 can feed shells through the attached chute to the die, as rapidly as though a mechanical feed were employed.

Fig. 10—In redrawing shells, an operator can keep up with the press by loading the pieces into this simple chute

Spring Pad Feeding Chute

Fig. 11 shows two views of a first-operation circularly drawn shell with a large flange. An elliptical flange is to be trimmed to the outline indicated by the dotted line. The trimming die is sketched in Fig. 12, and is shown inclined as used in the press. The spring-pad chute is a plate with a central channel cut parallel with its length. Width of the channel is such as to provide clearance for length *A* of the work. And the chute is sufficiently long to take one more shell than the one being trimmed. This is an inverted die, with the die attached to the punch holder, and with the punch below it on the die shoe.

After placing a shell in the chute, the shell slides by gravity over the trimming punch and stops against the lugs shown in the end view of the chute. A rectangular opening is cut through the chute that clears the width and length of the flange around the shell. This opening is located symmetrically over the trimming punch.

When the ram descends, an opening in shedder *B* fits around the outside diameter of the circular shell body, and thus positions the work accurately before die *C* descends, depresses the chute, and trims the flange over punch *D*. When the ram ascends, the work, having been cut into the die, is carried up with it, and is ejected by the action of the combination knock-out rod and the spring ejector pin, seen in the tool sketch. The finished work slides out behind the press.

The trimmed scrap frames are severed by the ram descent into four equal pieces. This is done by the upper die after trimming. The die crowds the scrap frames into contact with four cutting chisels attached on opposite sides of the punch, the punch being flared around its base, as shown. When several frames have been cut, and more of them follow, the chisel angles force the pieces of scrap away from the punch, and in contact with the flare. As more scrap is cut, the pieces below are forced out into four angular clearance holes *E*, through the die holder, and finally out through clearance holes *F*, in the bolster plate. The plan for the angular holes through the die holder, showing the seat for the trimming punch and chisels, is seen in Fig. 13. These match holes in the bolster.

If holes are to be pierced in the flange, piercing punches are attached in a punch plate just above the shedder. They pass down through the shedder with their faces flush with the die. Die holes are provided in the face of the trimming punch. Unless the output is sufficient to justify the expense of using this method of scrap disposal, holes *E* and *F* are omitted, and the scrap is occasionally removed with a hand-hook.

Automatic Magazine Chute

In Fig. 14 a cast-iron chute, attached to the front of a press bolster plate, is provided within by a double-action pawl escapement, or work release, operated by linkage connected

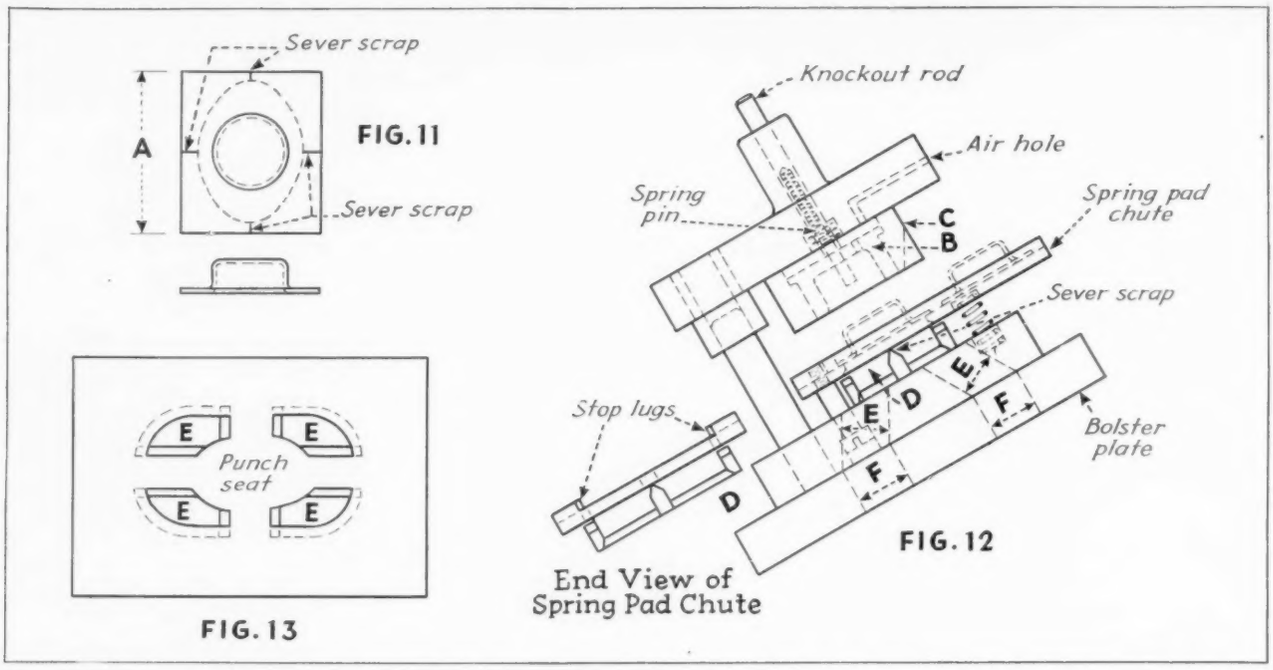


FIG. 11

FIG. 13

FIG. 12

End View of Spring Pad Chute

Fig. 11-13—The large flange of the circular shell is trimmed to an elliptical shape while held in the spring-pad chute on the inclined die. The chute holds two shells, one in position for trimming, and the second ready to slide in place through gravity when the first shell is trimmed and ejected

with an eccentric on the crankshaft. The blanks are stacked in the chute behind the pawl hooks. At each crank revolution, one piece is released by a rocker movement of the hooks, and slides into the die against suitable stops, where the punch descent locates the work for piercing, forming, trimming, or other operations.

When the pawl hooks nearest the die are raised to release a blank, the rear hooks are simultaneously lowered which checks the rear column of blanks, and prevents releasing more than one piece in each press cycle. The lateral distance between the pawl points is *less* than the width of the blanks. This provision allows a space for the rear hooks to enter while withholding the column. This not only increases production, but removes the operator's fear of injury. An automatic magazine chute attached to a gap press is shown in Fig. 15.

In still another application, the feeding device can be built into the

Figs. 14–15—These automatic magazine chutes are operated by linkage connected to the eccentric on the crankshaft, and feed one blank from the magazine at a time because of an escapement mechanism

Fig. 16—Where the quantity of work justifies the expense, the automatic magazine and chute feed can be built into the dies. Fig. 17—This magazine feed is manually operated, is cheaper than the automatic type, and affords safety in operation of a fast-running press

Fig. 18—Blanks of different widths can be fed from a magazine if the a pneumatic feed is built into the tools. The piston stroke can be varied to suit the blank width

Fig. 19—A stacking chute will bunch blanks coming from a press and deliver them in correct arrangement for succeeding operations

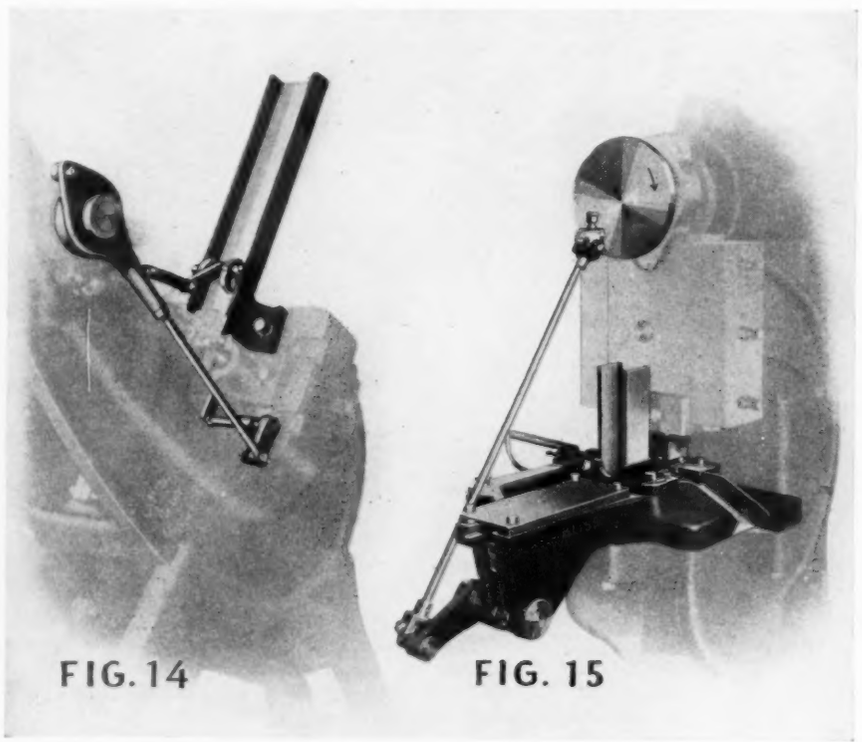


FIG. 14

FIG. 15

die itself; the important requirement being that the quantity to be made justifies the expense. The saving of time to be figured ranges from 50 to 100 per cent. It is evident that an operator cannot catch every stroke of a press running at 120 to 200 strokes per minute, but the automatic chute and magazine feed, shown in Fig. 16, will not fail to catch them all.

Blanks are stacked in a magazine at the front of the die. The view shown in the illustration is actually the rear of the tool. A sliding plate, with a U-slot through it, is arranged in a guide under the stack. The sliding plate has the same thickness as the blanks. One blank is taken from under the stack by dropping into the U-slot, when the slot is under the stack and the press is open. The angular slot, at the ends of the punch holder, moves the slide and blank forward when the ram descends, and places the blank over the die, just before the punch fully descends. A notch is sheared in the blank by the angular punch shown in the rear. When the ram ascends, this punch carries the blank above the initial stops, and strips it off against the bar shown across the dies. The press being inclined, the finished piece falls out in the rear.

Manually Fed Magazine and Chute

If one can design a tool that makes the operator feel safe in using it, he will work more quickly and easily. A device that meets this requirement is shown in Fig. 17. It operates on the same principle as the automatic feed, shown in Fig. 16, except that it is manually fed and is cheaper to build. The slide works between two positive stops, each of which must be fully contacted to feed the blanks correctly. The difficulty in using this chute is that the press may tbe tripped before the blank has been fully placed. This can be controlled by a clutch releasing device, or limit switch connected to the clutch. In the second case, the switch must be contacted by the advanced slide when the blank is correctly placed over the die, before the clutch can be tripped.

The labor required to operate the slide, in and out, is so slight that the operator can use his other hand to gather and place blanks in the magazine. Eighty blanks per minute is about the safe limit for blanks manually fed to a die. A good operator can attain this rate without fatigue.

In a pneumatic feed built into the die, a cylinder is connected with the compressed air line through a trip valve. The piston controls the movement of a slide plate under a magazine of blanks. The slide maintains a line of blanks in the chute, and feeds one piece forward into the dies, at each press cycle. Fig. 18 shows the general design. The advantage in using an air feed is its easy control. The feeding throw can be readily altered to suit blanks of different widths, and feeding can easily be timed.

Lightweight Tractor

Production has begun on a small tractor by R. L. Wood, Neville's Cross Durham, England, according to *Industrial Britain*. The new machine runs on gasoline, uses a 14 hp. engine and averages 14 s. a week running cost. It will haul three to four tons in top gear and six tons in lower gears.

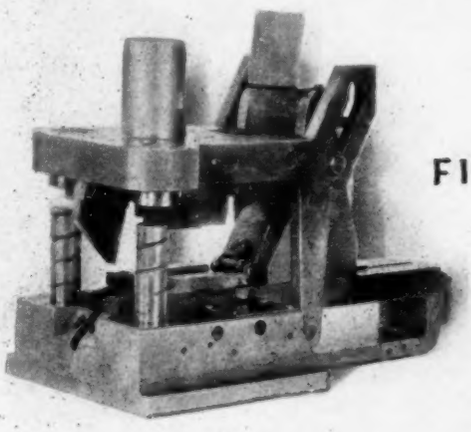


FIG. 16

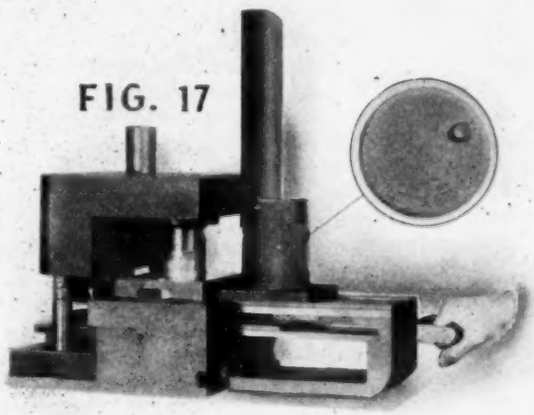


FIG. 17

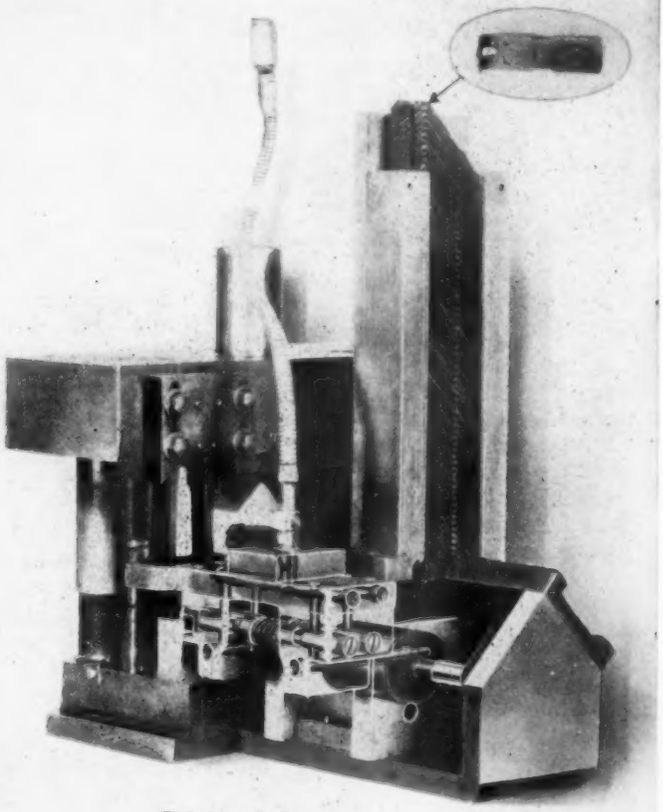


FIG. 18

IDEAS FROM PRACTICAL MEN

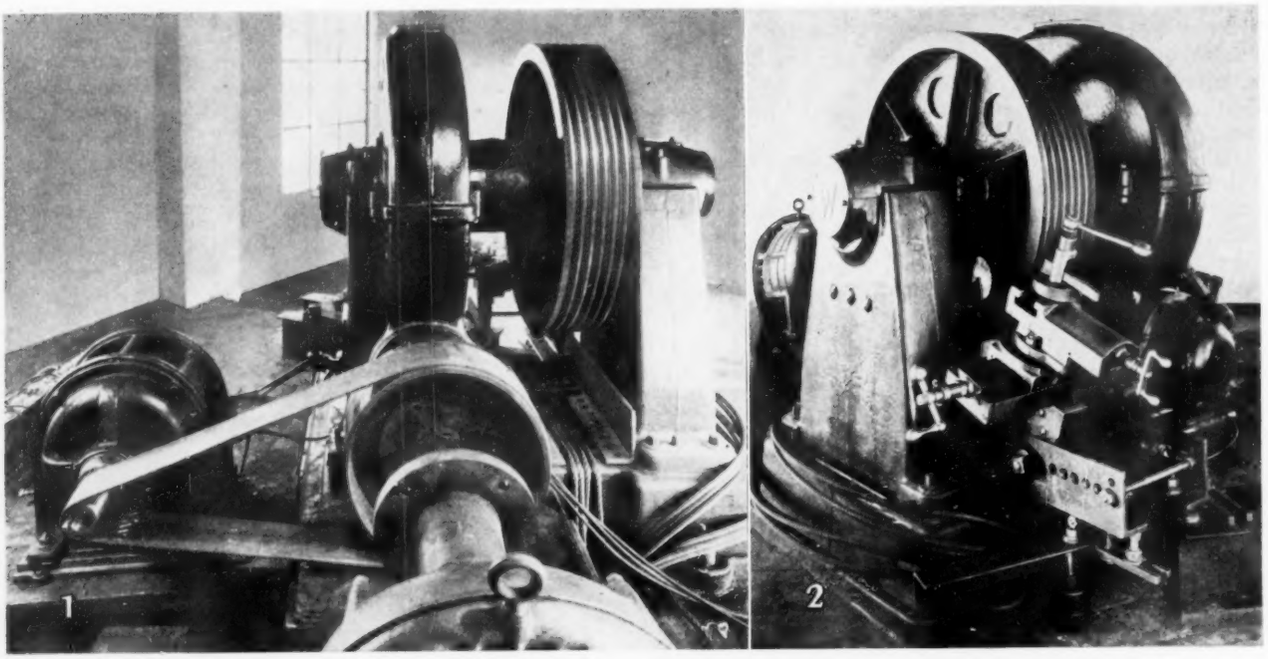


Fig. 1—A large pulley was put in place of the brake drum and was belted to a small pulley on the shaft of a slow-speed motor. Fig. 2—A large slide rest was mounted on blocks of the proper height and when the motor was started the grooves were re-turned by the tool

Taking the Tools to the Work

W. N. PHILLIMORE
Outside Superintendent of Elevator Repairs, The Maintenance Co.

Recently we were called upon to reform the grooves for the cables in the sheave of a traction-type elevator. As distinguished from the drum-type elevator in which the hoisting and counterweight cables are wound on a drum having half-round helical grooves, the grooves in the sheave of the traction-type elevator are V-shaped to grip the cables as they pass over it. Tractive or lifting power is obtained from the weight of the car at one end of the cables and that of the counterweights at the other end drawing the cables into the grooves. Since there is a certain amount of slippage of the cables in the grooves each time the car is started, the grooves eventually become worn and refuse to grip the cables. Then they must be reformed to renew their grip.

When conditions are such that the traction sheave can readily be removed, it is general practice to take it to the shop for reforming the grooves, but if the size and the weight of the sheaves make that impractical, the work must be done on the premises with the sheave in place. We decided on the latter course.

Since the normal speed of the sheave was too fast for turning, we uncoupled the motor from the worm shaft, installed a slow speed auxiliary motor with small pulley and belted it to the brake pulley, as shown in Fig. 1. We then mounted a large slide rest on blocks of the proper height and angle to bring the tool in a radial line with the center of the sheave, as shown in Fig. 2. Then with the motor started and the sheave revolving in its own bearings, we were ready to proceed with the job.

A few days after the work was finished we received a letter from the owners of the elevator complimenting us on the manner and the promptness with which we did the job.

Gear Tooth Layout for Large Pressure Angles

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Harrow, Middlesex, England

Many persons have found Grant's Odontograph method unsatisfactory for laying out gear teeth with pressure angles greater than 15 deg., because of interference. Wheels and pinions of 17, 20 or 23 deg. pressure angle have been laid out to the method described, and have given good service. Planetary gearing has also been cut to this design.

The method of laying out the tooth form, Fig. 1, is as follows: (1) draw the pitch circle; (2) draw the base circle equivalent to pitch radius times the cosine of the pressure angle; (3) draw the *X* circle equivalent to the base radius times 1 1/24.

From any point *a* on the pitch line describe an arc whose radius is 0.45 times the base radius, cutting the base circle at *b*. From *b* as a center describe face arc *ac* from the pitch circle

to the X circle. Connect *b* and *c*. On line *bc* lay off distance *cd* equal to 1/6 the base radius. From point *d* with radius *cd* describe the flank arc *ce*, running from the X circle to the base circle. Proportions of teeth are given in the table for various types of teeth.

An example of internal gearing developed by this method is shown in Fig. 2. The internal wheel has 93 teeth and a diametral pitch of 6. It meshes with a 21-tooth pinion. The X circle is not required for the internal gear, as it nearly coincides with the base line. In addition, one radius is used for both the face and flank of the tooth. In the pinion however, the X circle is drawn, likewise the face and flank radii. Points and bottoms of the teeth should be rounded by 0.02 in. radius. The pressure angle is 20 deg., and the usual addendum and dedendum are employed.

Calculations for this gearing are as follows:

For internal gear: Pitch circle radius, 7.75:; cos 20 deg. = 0.94. Base circle radius = 0.94 x 7.75 = 7.285. Flank radius = 7.285/6 = 1.2142. Only a face radius is required. Face radius = 7.285 x 0.45 = 3.278.

For pinion: Pitch circle radius = 1.75. Therefore base circle radius = 0.94 x 1.75 = 1.645. The face radius =0.45 x 1.645 = 0.742. The flank radius = 1.645/6 = 0.2471. The X circle radius = 1.645 x 1 1/24 = 1.7135.

Proportions of Gear Teeth

	Addendum	Dedendum	Radius of Root
Brown & Sharp	$\frac{1}{D\ P}$	$\frac{1.15708}{D\ P}$	$\frac{\text{Circular Pitch}}{20}$
Fractional pitches Example 4?5	1 Lower D P	1.15708 1.15708 Lower D P	$\frac{\text{Circular Pitch}}{20}$
Alternative Stub.	Circular pitch x.25	Circular pitch x.3	$\frac{\text{Circular Pitch}}{20}$

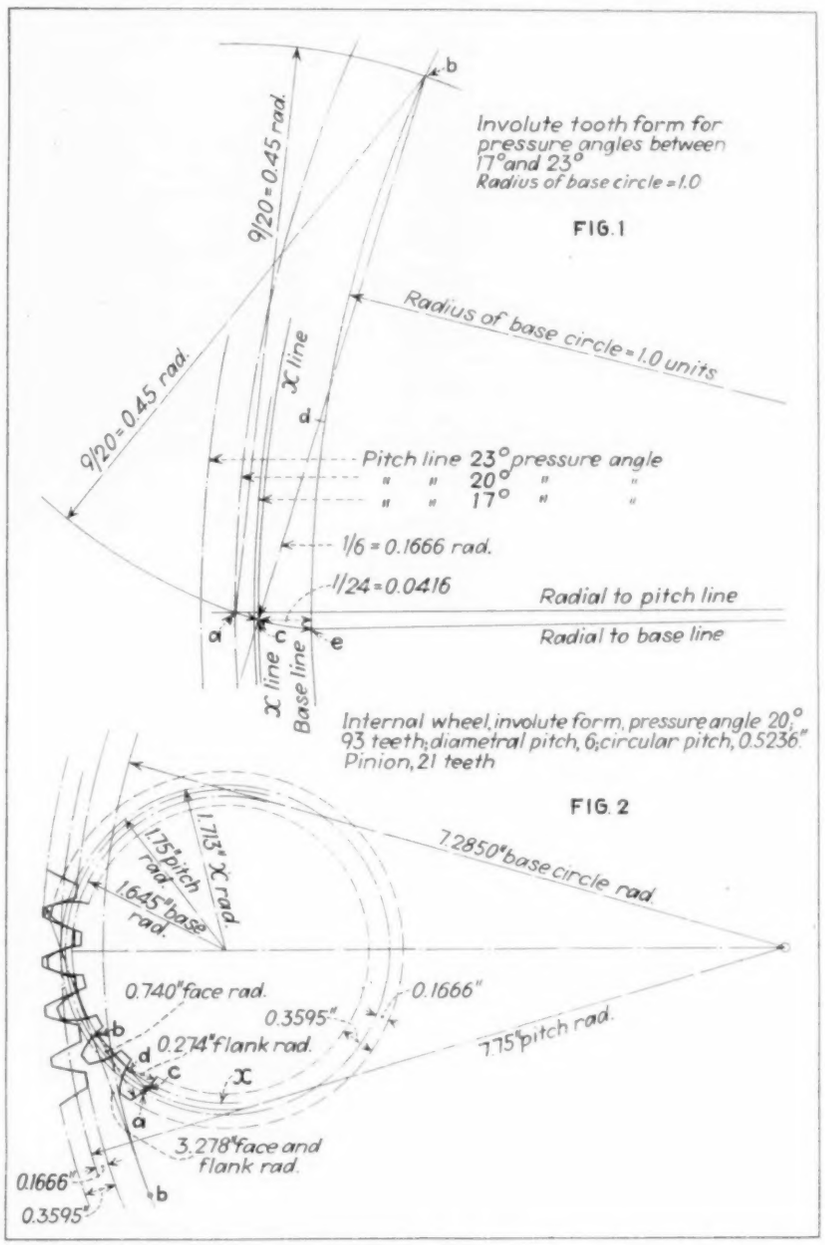


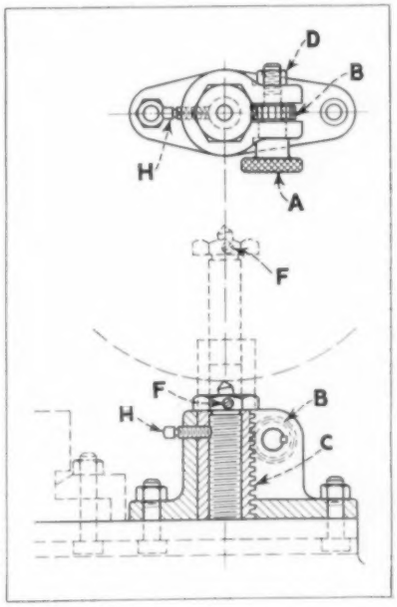
Fig. 1—Interference in gear teeth having pressure angles between 17 and 23 deg. is avoided by this method of tooth involute layout. Fig. 2—Internal gearing can be worked out by the same method, the full procedure being applied only to the pinion

Wheel Dressing Device for the Surface Grinder

J. R. WHITTLES

The wheel dressing device illustrated is attached to the table of the surface grinder at the right of the magnetic chuck and the diamond is adjusted for height by the knurled knob *A* through the pinion *B* and a rack cut on the side of the sleeve *C*. The range of adjustment can be increased by screwing the shank of the diamond holder out of the sleeve. The end of the pinion shaft is threaded for the nut *D* which is used to spring the metal around the sleeve and lock it in place.

The diamond setting is set in the outer end of the holder at an angle of 7 deg. and is held in place by the



In grinding many pieces of the same height, the diamond once set needs no adjustment. The wheel is lowered the amount it is to be dressed

setscrew *F* in the hexagon head. The threaded shank of the diamond holder is locked against turning by the setscrew *H* which has a brass plug under its point to prevent injury to the threads on the holder shank. A slot in the sleeve permits it to be raised or lowered without interference from the setscrew.

When the diamond has been set for dressing the wheel for a quantity of work of the same height, it can be left in position until the job has been finished. For dressing the wheel during progress of the work, the wheel is lowered to the diamond the amount it is to be dressed. With a device of this kind having a range of adjustment of 6 in., a great deal of time can be saved by not having to lower the wheel a great distance to reach the diamond and then having to raise it and adjust it to the work.

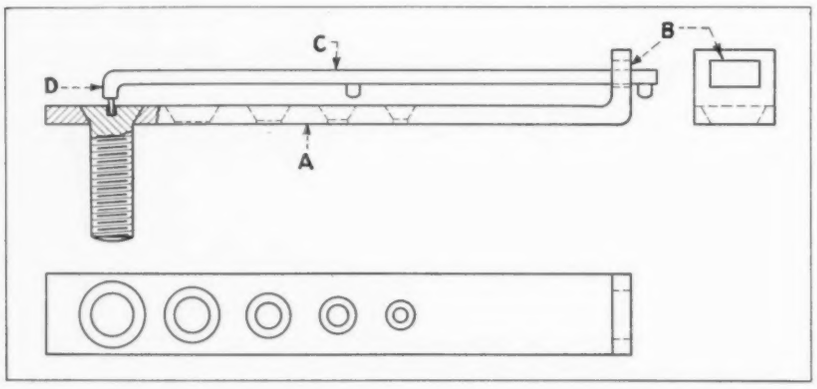
Holder for Rethreading Machine Screws

JOHN E. CORRIGAN

It sometimes happens that screws are too large for the tapped holes or that the threads are injured, necessitating running a die over them. In such cases the screws can not well be held in the vise without damage.

The simple little tool illustrated will hold either flat or round head screws without injury to their heads. The holder *A* has a series of countersunk holes for holding screws of different diameter. It is bent up at one end and is slotted at *B* for the blade *C* to pass through. The blade has a screwdriver point which is bent down at *D*, and has two pins projecting from its under side to prevent it from falling out through the slot in the holder when the tool is not in use.

In use, the tool is held in the hand and the blade is pressed down by the thumb so that the screwdriver point engages the slot in the head of a screw in the holder and prevents it from turning when the die is run over it. The die is held in a chuck in the lathe spindle and is revolved by pulling the belt by hand.



The tool is held in the hand and the screw is prevented from turning by pressing the screwdriver point of the blade into the slot in its head

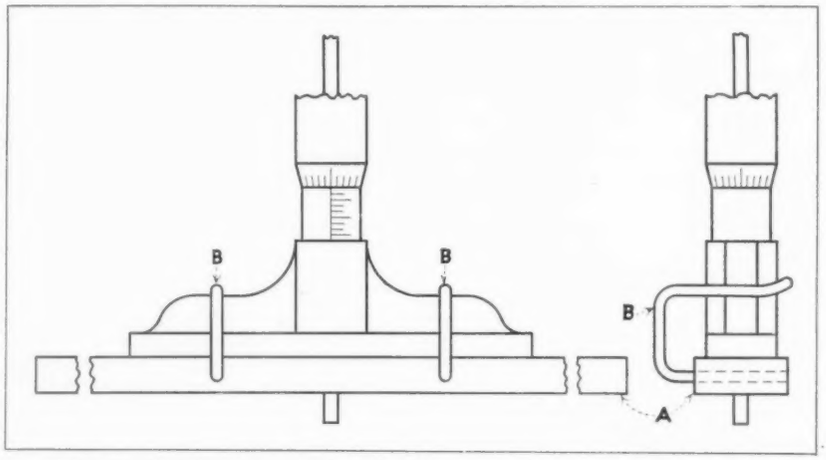
Extension Bar for the Micrometer Depth Gage

PETER VEIT

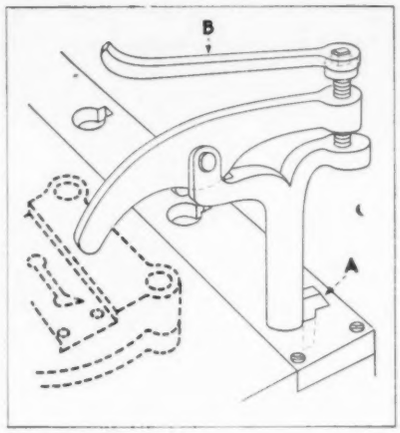
Foreman, Washington Iron Works

Reading the article under the above title by Bruce MacIntosh (*AM*—Vol. 81, page 742) reminded me of an extension bar I made for my depth mike for measuring the depth of depressions in toe cams.

Since my depth gage has a short base, I made an extension bar from a piece of $\frac{1}{2}$ x $\frac{3}{4}$ x 5-in. cold-rolled steel, as shown at *A* in the illustration. A clearance hole was drilled for the measuring rod and two holes were drilled for the spring wire clips *B* for attaching it to the gage. The wire clips prevent the extension bar from falling off downward and it is prevented from falling off either sidewise or endwise by the measuring rod projecting through the clearance hole.



The extension bar is attached to the depth gage by two spring wire clips. The measuring rod holds the bar both sidewise and endwise



This clamp can be raised, lowered or turned to suit a wide range of work and can be set in holes at intervals along the bench

Universal Bench Clamp

CHARLES H. WILLEY

Superintendent of Manufacturing, Hoyt Electrical Instrument Works

Repair and maintenance men will appreciate the convenience of the bench clamp illustrated. In doing such work as babbitting or cutting oil grooves in bearings, the work is easily located on that part of the bench most convenient for the operation. The clamp can be moved along a steel strip that is bored and keyseated at intervals and set flush in the bench for holding the post of the clamp firmly.

The clamp can be raised, lowered or turned to suit a wide range of work by loosening the gib-head taper key *A*. The only tool necessary for operating the clamp is the combined pinch bar and wrench *B*; the pinch bar for loosening the gib-head key and the wrench for operating the clamping screw.

AMERICAN MACHINIST *Reference Book Sheet*

Time-Data Sheet No. 7

Spray Painting Sheet Metal Parts—I

PART:

Sheet metal parts.

OPERATION:

Spray paint with paint gun in booth, applying two coats of paint to all surfaces.

LOCATION:

East Pittsburgh Works, Westinghouse Electric & Mfg. Co.

ALLOWED TIME:

Set Up: Standard hours = 0.578.

Each Piece: Standard hours = $(0.00147A \div N) + (\text{Table No. 1}) + (\text{Table No. 2})$.

Where: A = Number of times spray gun is picked up and laid aside.

N = Number of parts placed on table at one time.

Table No. 1—Place Part on Table, Paint, Place Part Aside

(Total Time for Two Coats of Paint Applied Separately)

Area Painted Square Inches	Allowed Time Decimal Hours	Area Painted Square Inches	Allowed Time Decimal Hours	Area Painted Square Inches	Allowed Time Decimal Hours
0 to 10	0.0052	491 to 510	0.0243	1211 to 1230	0.0404
11 to 20	0.0057	511 to 530	0.0250	1231 to 1250	0.0408
21 to 30	0.0062	531 to 550	0.0255	1251 to 1270	0.0412
31 to 40	0.0067	551 to 570	0.0260	1271 to 1290	0.0416
41 to 50	0.0073	571 to 590	0.0264	1291 to 1310	0.0420
51 to 60	0.0078	591 to 610	0.0269	1311 to 1330	0.0424
61 to 70	0.0083	611 to 630	0.0276	1331 to 1350	0.0429
71 to 80	0.0088	631 to 650	0.0278	1351 to 1370	0.0433
81 to 90	0.0094	651 to 670	0.0282	1371 to 1390	0.0437
91 to 100	0.0100	671 to 690	0.0287	1391 to 1410	0.0441
101 to 110	0.0106	691 to 710	0.0291	1411 to 1430	0.0445
111 to 120	0.0112	711 to 730	0.0295	1431 to 1450	0.0449
121 to 130	0.0117	731 to 750	0.0299	1451 to 1470	0.0453
131 to 140	0.0123	751 to 770	0.0304	1471 to 1490	0.0458
141 to 150	0.0128	771 to 790	0 0308	1491 to 1510	0.0462
151 to 160	0.0133	791 to 810	0.0312	1511 to 1530	0.0466
161 to 170	0.0137	811 to 830	0.0316	1531 to 1550	0.0470
171 to 180	0.0141	831 to 850	0.0321	1551 to 1570	0.0474
181 to 190	0.0146	851 to 870	0.0326	1571 to 1590	0.0478
191 to 200	0.0149	871 to 890	0.0330	1591 to 1610	0.0483
201 to 215	0.0154	891 to 910	0.0334	1611 to 1630	0.0488
216 to 230	0.0159	911 to 930	0.0338	1631 to 1650	0.0492
231 to 245	0.0164	931 to 950	0.0342	1651 to 1670	0.0496
246 to 260	0.0168	951 to 970	0.0346	1671 to 1690	0.0500
261 to 275	0.0173	971 to 990	0.0351	1691 to 1710	0.0504
276 to 290	0.0178	991 to 1010	0.0355	1711 to 1730	0.0509
291 to 310	0.0183	1011 to 1030	0.0360	1731 to 1750	0.0513
311 to 330	0.0189	1031 to 1050	0.0364	1751 to 1770	0.0517
331 to 350	0.0196	1051 to 1070	0.0368	1771 to 1790	0.0521
351 to 370	0.0202	1071 to 1090	0.0372	1791 to 1810	0.0526
371 to 390	0.0208	1091 to 1110	0.0376	1811 to 1830	0.0530
391 to 410	0.0214	1111 to 1130	0.0380	1831 to 1850	0.0535
411 to 430	0.0220	1131 to 1150	0.0385	1851 to 1870	0.0539
431 to 450	0.0227	1151 to 1170	0.0390	1871 to 1890	0.0543
451 to 470	0.0233	1171 to 1190	0.0395	1891 to 1910	0.0547
471 to 490	0.0238	1191 to 1210	0.0399	1911 to 1930	0.0551

Note: The term "allowed time" used in these and following data represents the time required by any worker to perform a given unit of work, using average skill, showing average effort, under average conditions, with average consistency, allowing for fatigue, personal needs and unavoidable delays. *It is the time within which the worker is expected to perform that work.* All times are given in decimal hours. Accurate conversions to minutes and seconds can be made by means of the following formulas: Decimal hours x 60 = decimal minutes; decimal hours x 3600 = decimal seconds. The data given represents standards developed for use at the East Pittsburgh Works of Westinghouse Electric & Manufacturing Company for conditions of work existing in that plant. Each allowance should be checked in the light of local conditions before being applied in any other plant.

AMERICAN MACHINIST *Reference Book Sheet*

Time-Data Sheet No. 8

Spray Painting Sheet Metal Parts—II

Table No. 1—Place Part on Table, Paint, Place Part Aside (*Continued*)

(Total Time for Two Coats of Paint Applied Separately)

Area Painted Square Inches	Allowed Time Decimal Hours	Area Painted Square Inches	Allowed Time Decimal Hours	Area Painted Square Inches	Allowed Time Decimal Hours
1931 to 1950	0.0555	3151 to 3170	0.0817	5521 to 5560	0.1588
1951 to 1970	0.0560	3171 to 3190	0.0822	5561 to 5600	0.1600
1971 to 1990	0.0564	3191 to 3210	0.0826	5601 to 5640	0.1612
1991 to 2010	0.0568	3211 to 3240	0.0922	5641 to 5680	0.1623
2011 to 2030	0.0572	3241 to 3280	0.0931	5681 to 5720	0.1634
2031 to 2050	0.0576	3281 to 3320	0.0942	5721 to 5760	0.1645
2051 to 2070	0.0581	3321 to 3360	0.0954	5761 to 5800	0.1657
2071 to 2090	0.0586	3361 to 3400	0.0965	5801 to 5840	0.1668
2091 to 2110	0.0590	3401 to 3440	0.0977	5841 to 5880	0.1680
2111 to 2130	0.0595	3441 to 3480	0.0988	5881 to 5920	0.1690
2131 to 2150	0.0599	3481 to 3520	0.0998	5921 to 5960	0.1702
2151 to 2170	0.0603	3521 to 3560	0.1010	5961 to 6000	0.1714
2171 to 2190	0.0607	3561 to 3600	0.1021	6001 to 6040	0.1725
2191 to 2210	0.0612	3601 to 3640	0.1033	6041 to 6080	0.1737
2211 to 2230	0.0616	3641 to 3680	0.1045	6081 to 6120	0.1748
2231 to 2250	0.0620	3681 to 3720	0.1057	6121 to 6160	0.1760
2251 to 2270	0.0624	3721 to 3760	0.1069	6161 to 6200	0.1771
2271 to 2290	0.0628	3761 to 3800	0.1081	6201 to 6240	0.1783
2291 to 2310	0.0632	3801 to 3840	0.1092	6241 to 6280	0.1794
2311 to 2330	0.0636	3841 to 3880	0.1103	6281 to 6320	0.1805
2331 to 2350	0.0641	3881 to 3920	0.1115	6321 to 6360	0.1817
2351 to 2370	0.0645	3921 to 3960	0.1126	6361 to 6400	0.1828
2371 to 2390	0.0649	3961 to 4000	0.1138	6401 to 6440	0.1840
2391 to 2410	0.0654	4001 to 4040	0.1149	6441 to 6480	0.1851
2411 to 2430	0.0659	4041 to 4080	0.1160	6481 to 6520	0.1863
2431 to 2450	0.0663	4081 to 4120	0.1172	6521 to 6560	0.1874
2451 to 2470	0.0667	4121 to 4160	0.1183	6561 to 6600	0.1886
2471 to 2490	0.0672	4161 to 4200	0.1195	6601 to 6640	0.1898
2491 to 2510	0.0676	4201 to 4240	0.1207	6641 to 6680	0.1909
2511 to 2530	0.0680	4241 to 4280	0.1218	6681 to 6720	0.1922
2531 to 2550	0.0684	4281 to 4320	0.1229	6721 to 6760	0.1933
2551 to 2570	0.0688	4321 to 4360	0.1241	6761 to 6800	0.1945
2571 to 2590	0.0692	4361 to 4400	0.1252	6801 to 6840	0.1956
2591 to 2610	0.0697	4401 to 4440	0.1264	6841 to 6880	0.1968
2611 to 2630	0.0701	4441 to 4480	0.1277	6881 to 6920	0.1980
2631 to 2650	0.0706	4481 to 4520	0.1289	6921 to 6960	0.1992
2651 to 2670	0.0710	4521 to 4560	0.1300	6961 to 7000	0.2004
2671 to 2690	0.0714	4561 to 4600	0.1311	7001 to 7040	0.2016
2691 to 2710	0.0719	4601 to 4640	0.1323	7041 to 7080	0.2028
2711 to 2730	0.0723	4641 to 4680	0.1334	7081 to 7120	0.2038
2731 to 2750	0.0728	4681 to 4720	0.1346	7121 to 7160	0.2049
2751 to 2770	0.0732	4721 to 4760	0.1357	7161 to 7200	0.2060
2771 to 2790	0.0736	4761 to 4800	0.1369	7201 to 7240	0.2072
2791 to 2810	0.0740	4801 to 4840	0.1381	7241 to 7280	0.2084
2811 to 2830	0.0745	4841 to 4880	0.1393	7281 to 7320	0.2097
2831 to 2850	0.0749	4881 to 4920	0.1404	7321 to 7360	0.2109
2851 to 2870	0.0753	4921 to 4960	0.1415	7361 to 7400	0.2121
2871 to 2890	0.0758	4961 to 5000	0.1427	7401 to 7440	0.2132
2891 to 2910	0.0762	5001 to 5040	0.1438	7441 to 7480	0.2143
2911 to 2930	0.0766	5041 to 5080	0.1450	7481 to 7520	0.2155
2931 to 2950	0.0770	5081 to 5120	0.1461	7521 to 7560	0.2166
2951 to 2970	0.0775	5121 to 5160	0.1473	7561 to 7600	0.2179
2971 to 2990	0.0779	5161 to 5200	0.1485	7601 to 7640	0.2190
2991 to 3010	0.0783	5201 to 5240	0.1497	7641 to 7680	0.2203
3011 to 3030	0.0788	5241 to 5280	0.1508	7681 to 7720	0.2214
3031 to 3050	0.0792	5281 to 5320	0.1519	7721 to 7760	0.2225
3051 to 3070	0.0797	5321 to 5360	0.1531	7761 to 7800	0.2237
3071 to 3090	0.0801	5361 to 5400	0.1542	7801 to 7840	0.2248
3091 to 3110	0.0805	5401 to 5440	0.1554	7841 to 7880	0.2259
3111 to 3130	0.0809	5441 to 5480	0.1565	7881 to 7920	0.2270
3131 to 3150	0.0813	5481 to 5520	0.1577	7921 to 7960	0.2283

(To be concluded in an early issue.)

NEWS OF THE INDUSTRY

National Metal Exposition and Congress To Be Held in Detroit

Annual Convention of American Society for Metals Scheduled for Third Week in October

CLEVELAND—Over 10,000 metal men are expected to attend the National Metal Exposition and Congress in Detroit, according to estimates made by the American Society for Metals, sponsors of the functions. More than 230 leading industrial companies have already reserved exhibition space in Convention Hall, and approximately 50 lectures are scheduled in the tentative technical program for the convention.

Industry, government and college will be well represented among the 76 men who have devoted considerable research during the past year to this program.

On the morning of Monday, October 17, the technical activities will get off to a flying start with two simultaneous morning sessions. Featured throughout the week will be two educational courses, one dealing with pyrometry and the other taking up the machinability of steels and nonferrous metals. The entire program, as arranged at present, follows:

MONDAY, OCTOBER 17

Morning Session

Softening Rate of a Steel When Tempered from Different Initial Structures—E. H. Engel, Carnegie-Illinois Steel Corp.

Selective Hardening with the Oxy-Acetylene Flame—R. L. Rolf, Lakeside Steel Improvement Co.

Reactions to Annnealing above the Eutectoid Temperature of Quenched Hypereutectoid Steels—C. R. Austin and M. C. Fetzer, Pennsylvania State College.

Morning Simultaneous Session

Relation Between the Rockwell "C" and Diamond Pyramid Hardness Scales—Howard Scott and T. H. Gray, Research Laboratories, Westinghouse Electric & Manufacturing Co.

Absolute Hardness—E. G. Mahin and G. J. Foss, Jr., University of Notre Dame.

The Effects of Fibre on the Notch Toughness of Mild Steel as Influenced by Cooling Rate—O. W. Ellis, Ontario Research Foundation, Toronto and J. E. McDonell, Queen's University, Kingston, Canada.

A New Method for the Rapid Determination of Carbon in Samples of Plain Carbon Open-Hearth Steel—B. A. Rogers, Karl Wentzel and J. P. Riott, Bureau of Mines.

Afternoon Session

Effects of Special Alloy Additions to Stainless Steels—Russell Franks, Union Carbide & Carbon Res. Labs., Inc.

Stress-Corrosion Cracking in Austenitic Stainless Steels—S. L. Hoyt and M. A. Scheil, Department of Metallurgical Research, A. O. Smith Corp.

Some Observations on the Passivity of Stainless Steels—J. N. Ostrofsky, Rustless Iron and Steel Corp.

Educational Lectures

4:30 P. M. Physics of Cutting—Hans Ernst, Cincinnati Milling Machine Co.

8:00 P. M. Pyrometry—R. B. Sosman, Research Laboratories, U. S. Steel Corp.

TUESDAY, OCTOBER 18

Morning Session

Influence of Chromium, Silicon and Aluminum on the Oxidation Resistance of Intermediate Alloy Steels—A. E. White, C. L. Clark, University of Michigan, and C. H. McCollam, Timkin Roller Bearing Co.

Influence of Aluminum on Cast Corrosion Resisting Steel—J. A. Duma, Norfolk Navy Yard.

Development in Molybdenum High Speed Cutting Steels—W. R. Breeler, Ludlum Steel Co.

Morning Simultaneous Session

Some Properties of Oxygen-Free High Conductivity Copper (OFHC)—C. G. Goetzel, Hardy Metallurgical Co.

A New 70/30 Nickel-Copper Alloy Subject to Precipitation Hardening—Erich Fetz, Wilbur B. Driver.

Effects of Substantial Additions of Aluminum, Cobalt, Titanium and Columbium on the Properties of 80 Ni-20 Cr Alloys—A. L. Sanford and O. E. Harder, Battelle Memorial Institute.

Afternoon Session

The Production of Flakes by Treating Molten Steel with Hydrogen and the Time of Cooling Necessary to Prevent their Formation—R. E. Cramer and E. C. Bast, University of Illinois.

Effect of Carbon Content on the Oxidation of Steel—C. A. Siebert, University of Michigan.

Some Effects of Deoxidizers in Low Carbon—

LATE *NEWS* WIRES

OTTAWA—The entire Canadian aircraft industry will participate in a huge program calling for construction of British military planes. Only frames, mostly for heavy bombers, will be built. Engines will be shipped from England and completed machines flown back to Britain. Companies included in the program will augment their existing capacity to make main aircraft components in conjunction with two new central manufacturing plants, each to cost $300,000, which will be built at Montreal and Toronto. The two central plants will be operated by a central company which will contract with the British government for work and which will be headed by Paul F. Sise of Montreal, president of Northern Electric Co. Two groups will be united in a central organization to make heavy bombers. In the Montreal area will be Canadian Vickers, Canadian Car & Foundry and Fairchild Aircraft, Ltd. In the Toronto area will be National Steel Car of Hamilton, Fleet Co. of Fort Erie and Ottawa Car Mfg. Co. Lighter planes will be made by De Haviland Co. of Toronto, Club Aircraft Co. of Hamilton, Noorduyn Co. of Montreal and Montreal Aircraft Industries Co. In addition the Boeing Co. of Vancouver and Fort William plant of Canadian Car & Foundry will receive individual orders direct from the British government.

DETROIT—A sharp decrease in the number of claims for unemployment insurance and some discontinuances of checks for workers recalled to the automotive and other plants were reported by the state unemployment compensation commission.

WASHINGTON—Ordnance men believe the army board that mapped the educational orders program (see page 812g) did not determine the division of this year's $2,000,000 among the six items listed. They think negotiations with manufacturers may show that nearly the entire sum will be needed for two or three items, which are believed to be listed in their order of importance.

WASHINGTON—In addition to educational orders the War Department is considering power, skilled labor supply, raw materials and transportation as four other major defense problems. Specific action is expected soon.

Among Those to Speak at Detroit Metal Congress

W. R. BREELER

G. T. WILLIAMS

G. V. LUERSSEN

1.5% Chromium Steel—Walter Crafts and J. L. Lamont, Union Carbide and Carbon Res. Lab.

Educational Lectures

4:30 P. M. Machinability of Ingot Iron, Wrought Iron, S.A.E. Steels and Stainless Steels—H. B. Knowlton, International Harvester Co.

8:00 P. M. Pyrometry—R. B. Sosman, Research Laboratories, U. S. Steel Corp.

WEDNESDAY, OCTOBER 19

Morning Session

Annual Meeting of the A.S.M.

1938 Award De Mille Campbell Memorial Lecture—A. L. Boegehold.

Afternoon Session

Graphitizing Rate and Nodule Number—H. A. Schwartz and M. K. Barnett, National Malleable & Steel Castings Co.

The Effect of Type of Cold-Deformation on the Recrystallization Properties of Armco Iron—H. F. Kaiser and H. F. Taylor, Div. of Physical Metallurgy, Naval Research Laboratory.

Constitution Diagrams for Iron-Carbon-Molybdenum Alloys—J. R. Blanchard, R. M. Parke, and A. J. Herzig, Climax Molybdenum Co.

Educational Lectures

4:30 P. M. Some Factors Affecting the Machinability of Cast Steel, Cast Iron, and Malleable Iron—J. W. Bolton, Lunkenheimer Co.

8:00 P. M. Pyrometry—R. B. Sosman, Research Laboratories, U. S. Steel Corp.

THURSDAY, OCTOBER 20

Morning Session

White Layer Structure in the Erosion of Machine Gun Barrels—W. H. Snair, American Can Co., and W. P. Wood, University of Mich.

The Influence of Microstructure upon the Process of Diffusion in Solid Metals—F. N. Rhines and Cyril Wells, Carnegie Institute of Technology.

Study of Carbide Solution in Hypoeutectoid Plain Carbon and Low Alloy Commercial Steels—R. M. Lauderdale and O. E. Harder, Battelle Memorial Institute.

Morning Simultaneous Session

Possible Uses of Radioactive Substance in the Testing of Metals—Herman F. Kaiser, Naval Research Laboratories.

Color Carbon and Aging—Carl L. Shapiro, Consulting Engineer.

Hardness Gradients in Tempered Steel Cylinders—C. A. Rowe and R. A. Ragatz, University of Wisconsin.

Afternoon Session

Symposium on Hardenability of Medium and Low Alloy Steels

The Physics of Hardenability. The Mechanism and the Rate of the Decomposition of Austenite—R. F. Mehl, Carnegie Institute of Technology.

Hardenability, Its Relation to Quenching and Some Quantitative Data—M. A. Grossmann, M. Asimow and S. F. Urban, Carnegie-Illinois Steel Corp.

Behavior of Carbides as Affecting Hardenability—H. W. McQuaid, Republic Steel Corp.

Educational Lecture

4:30 P. M. Machinability of Tool Steels—A. H. d'Arcambal and W. E. Bancroft, Pratt & Whitney Co.

FRIDAY, OCTOBER 21

Morning Session

Symposium on Hardenability of Medium and Low Alloy Steels

Hardenability Tests—W. E. Jominy, General Motors Corp.

Hardenability of Low Chromium Steels—Walter Crafts and J. L. Lamont, Union Carbide & Carbon Res. Labs., Inc.

Transverse Hardness Tests of Heat Treated Steels—G. T. Williams, Cleveland Tractor Co.

Morning Simultaneous Session

A Method for the Preparation of Metallographic Specimens—G. A. Ellinger and J. S. Acken, National Bureau of Standards.

Automatic Polishing of Metallurgical Specimens Using Cast Iron and Lead Laps—T. C. Jarrett, American Optical Co.

A Metallographic Approach to the Study of the Sensitivity of Steel to Cold Work—H. K. Work and S. L. Case, Jones and Laughlin Steel Corp.

Afternoon Session

Symposium on Hardenability of Medium and Low Alloy Steels

Hardenability and Its Designation, the Hardenability Line—B. R. Queneau and W. H. Mayo, Carnegie-Illinois Steel Corp.

Hardeneability of Plain Carbon Steels—J. L. Burns, Republic Steel Co., and G. C. Riegel, Caterpillar Tractor Co.

Hardenability in Light Sections—G. V. Luerssen, Carpenter Steel Co.

Educational Lectures

4:30 P. M. Machining Nonferrous Materials (Cast and Wrought)—H. P. Croft, Chase Brass and Copper Co., Cleveland.

Exports of Machinery During July, 1938

	July 1938	June 1938	July 1937
Electrical machinery	$8,006,504	$8,342,535	$10,275,037
Power generating machinery except automotive and electric	1,039,002	1,441,628	1,381,981
Construction and conveying machinery	1,745,007	2,047,131	2,175,727
Mining, well and pumping machinery	6,177,260	6,419,375	5,764,288
Power driven, metal-working machinery	6,488,415	8,000,189	4,665,741
Other metal-working machinery	338,223	320,866	439,351
Textile machinery	1,208,579	[598,970	[1,073,709

Exports of Metal Working Machinery During July, 1938

Engine lathes	$555,536	$587,931	$388,936
Turret lathes	273,530	647,311	346,201
Other lathes	252,586	165,451	98,490
Vertical boring mills and chucking machines	251,506	294,616	238,970
Thread cutting and automatic screw machines	327,499	384,264	327,683
Knee and column type milling machines	275,813	410,894	199,163
Other milling machines	578,739	772,421	227,157
Gear-cutting machines	272,286	349,201	84,474
Vertical drilling machines	34,730	93,886	95,218
Radial drilling machines	37,286	43,698	55,869
Other drilling machines	155,559	171,286	63,078
Planers and shapers	293,704	253,730	56,412
Surface grinding machines	155,735	152,512	128,391
External cylindrical grinding machines	164,466	647,472	39,848
Internal grinding machines	212,776	225,627	223,720
Tool grinding, cutter grinding, and universal grinding machines	174,805	185,043	124,311
Other metal-grinding machines and parts	235,356	136,248	170,305
Sheet and plate metal-working machines and parts	831,092	533,456	284,626
Forging machinery and parts	53,917	406,142	143,040
Rolling mill machinery and parts	626,454	737,569	578,824
Foundry and molding equipment and parts	117,950	234,613	95,953
Other power-driven metal-working machinery and parts	607,090	566,818	695,091

Other Metal-Working Machinery

Pneumatic portable tools	$96,389	$97,976	$113,938
Portable and hand and foot operated metal-working machines and parts	113,248	134,143	127,481
Chucks for machine tools	58,404	18,856	25,210
Milling cutters, machine operated threading dies and taps and similar machinery operated metal cutting tools	38,384	42,995	87,497
Other metal-working machine tools	31,798	26,896	85,225

DETROIT LETTER

Factories have revised upward their Fall production schedules . . . Dealers have only small number of new cars on hand . . . Grant of General Motors predicts 25 per cent gain in 1939 . . . Guerilla set-up likely to prevail in automobile labor circles

DETROIT—It is hard to find a pessimist in Detroit these days. An appraisal of the situation, on the verge of the '39 season, indicates that the current optimism is justified.

Dealers have sold many more used cars this year than new cars, hence have much fewer trade-ins on hand than at the beginning of the year. At the same time they are short of new cars and expect to deliver the first 1939 models to customers as soon as they are received. The "lift" in new car sales during the summer foreshadows a brisk Fall demand.

In view of the improved sales outlook, factories have revised upward their first estimates of Fall production. Buick, for example, has moved ahead its manufacturing schedules ten days, has purchased 35,000 tons of steel and plans on building 55,000 of its '39 models prior to December 1.

From the long-term point of view, the industry's brass hats are hopeful but temperate in their predictions. Perhaps they remember the glowing statements made a year ago about the 1938 outlook. Anyway they are content to stick to the prophecy that 1939 will be about 20 percent better than this year. Vice-president R. H. Grant of General Motors goes a bit farther and puts the increase at 25 percent. If the predictions hold, 1939 will see assemblies of 2,800,000 to 3,500,000 cars.

One fact is well established. Despite all the ballyhoo about big purchases of materials and tens of millions of dollars spent on retooling (which reports came out of factory publicity offices, car makers intend to move with extreme caution. There will be no headlong output of automobiles in the hope that they will sell. Dealers will be stocked with new models with as little delay as possible; then factory executives will wait to see what happens.

What will the new cars have that 1938 models don't possess? Well, "further refinements" is the major answer. They will be zippier in appearance due to widespread adoption of the Lincoln-Zephyr motif. Running boards will be narrower, bodies wider, hence more room for car occupants. Engines will be approximately the same, though slightly stepped up in power. Brakes will be better, with Ford finally going to hydraulic brakes. Coil springs will be more widely used, with Chrysler-made cars returning to them. The gear-shift lever will disappear from the middle of the floor of the front compartment, being on the steering wheel. Automatic transmissions will be postponed until 1940.

Internecine warfare in the United Automobile Workers doesn't mean that the unionists necessarily will be too busy to stir up trouble when the new season gets under way. Well-posted observers look for a guerilla set-up to prevail in automotive labor circles the coming year. That is, strong local unions will be pretty much a law unto themselves. If they see an advantage in a strike, they will provoke one. Example: Fisher Body locals say that they will ask for revision of their present contract to provide for a check-off and the closed shop. If they persist, it's a good bet that they won't get what they want. Nash is in the midst of trouble because it has closed its Racine plant and concentrated production at Kenosha. Unionists have halted removal of dies from Racine.

Studebaker Builds Own Equipment—For drilling valve guides, Studebaker workmen designed and built this machine under the supervision of their repair foreman. The four-spindle drill does as much work as a previous eight-spindle machine, and is equipped with variable feed to suit the operator's most efficient pace

Machine Tool Exports Continue At Satisfactory Level

Strained Financial Situations in Latin America Constitute Chief Obstacles to Trade

NEW YORK—The Latin American field is at present not only a good market for machine tools but apparently will continue to be among the better outlets for many years to come, according to sentiment among representative exporters here. In addition to the European tension serving to ease competition somewhat, South American machine tool users in particular are coming to lean more and more heavily on the service and quality afforded them by American manufacturers. Conservative exporters are anticipating several satisfying years of South American trade due to that continent's steady industrial expansion.

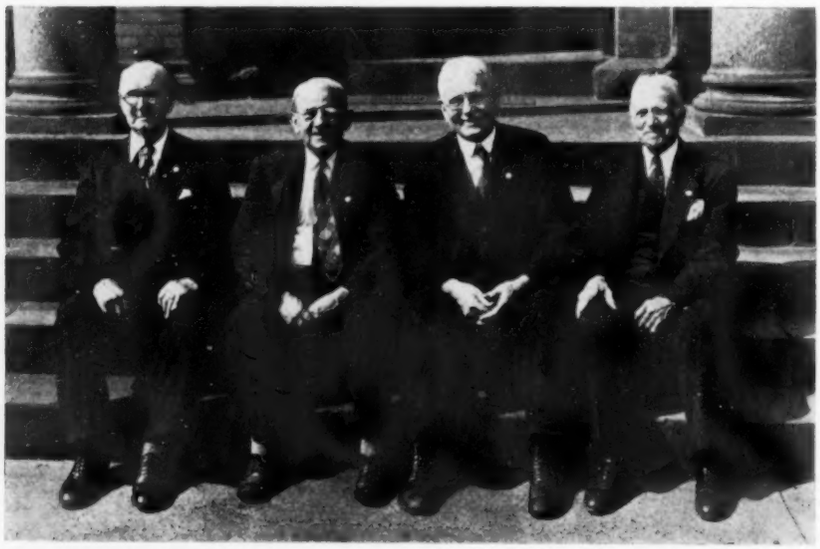
Reports indicate that satisfactory markets for American machine tools and general shop equipment now exist in the Argentine, Peru, Brazil, Columbia and Venezuela, where buying has been somewhat improved. Unusual signs of activity have been noticed in Ecuador and Chile during the past month, and this is expected to continue for the next few months. Honduras and Puerto Rico have both shown an appreciable demand for American products. Exchange difficulties continue to be a major factor in trading with these countries.

Despite the diplomatic rumblings in Mexico, there continues to be a fair demand for American machinery in that country. Money has tightened up, but a freer flow of currency to the United States is expected as soon as the tension has eased. One prominent exporter reports a fairly large backlog of orders and several important deals still in the negotiation stage, all pending developments in Mexican finance.

A considerable amount of trade with the North China area is being held up because of similar difficulties. Authorities report that the exchange situation has not eased appreciably in recent weeks, and the recent Manchukuo barter agreement with Germany has somewhat adversely affected trade in that region. However, one prominent machine-tool exporter, whose orders have previously been divided about evenly between South America and the Far East, reports the bulk of his inquiries in the last few weeks coming from the latter area. He has received a number of inquiries from the interior of China within the last fortnight, both for metal-working machinery and for electrical equipment. Business with Japan remains on a satisfactory level, with steady machine tool orders and prompt payment being the custom.

Russia is reported to be sending another commission to the United States for the purpose of buying a considerable volume of machine tools. Although this rumor cannot be confirmed, it seems logical in view of the European situation in general and in the light of recent Russian purchases.

Although it is generally recognized by now that South Africa offers a future field for industrial machinery sales, little is being done to exploit this potential market. Most companies are treading warily in this territory, due to the necessity of considerable additional organization and its attendant expense. Since the market is expected to develop rather slowly, at least at the outset, most American firms seem content to let foreign competition carry the expense of the initial development.



Two Centuries of Service—Two hundred and thirty-two years of loyal service with Pratt & Whitney Division of Niles-Bement-Pond Co. are represented by these four veterans. Members of the "Forty Plus" club of Hartford County, Connecticut, they are, with their years of continuous service, respectively: Wilbur M. Gladding, 56; John F. Galvin, Sr., 53; Henry C. Stevenson, 52; Flavel W. Woodworth, 71.

Iron and Steel Engineers Plan Exposition

PITTSBURGH—More than 5000 steel mill executives and operating engineers are expected to attend the 34th annual convention and iron and steel exposition of the Association of Iron and Steel Engineers, which will be held in the Cleveland Public Auditorium Sept. 27–30. At the technical sessions twenty papers will be presented by leading men in the industry, covering the phases of electrical, mechanical, metallurgical, combustion and lubrication engineering as applied to the steel industry.

Hartford Association Honors Industrial Old Timers

HARTFORD—Recognition of the importance of experienced men in industry was the occasion for a banquet given recently by the Manufacturers Association of Hartford County, Conn., in honor of employees of 40 years' service and upward. Speaker of the evening was Wilbur L. Cross, governor of Connecticut, who emphasized the importance of skilled, experienced workers in giving stability to industrial enterprises.

Over 600 members of the "Forty Plus" club attended the banquet in their honor. Including both men and women in the Hartford area who have been associated with the same manufacturing company continuously for forty years or more, the club prides itself on its members' unqualified loyalty and enthusiasms.

WATCHING WASHINGTON

Metal-working industry closely watches administration of wage-hour law . . . Monopoly investigation apparently becoming less formidable . . . Wagner Act amendment seen highly probable . . . Additional armament appropriations expected . . . Walsh-Healy steel wage rates announced soon

McGRAW-HILL WASHINGTON BUREAU
(Paul Wooton, Chief)

WASHINGTON—Washington representatives of the metal-working industry are looking and learning while the Labor Department's wage-hour administration tests its sights in textiles and tobacco. The first snag that Administrator Elmer Andrews ran into was the "definition" of the industry. What employee groups should be included and represented on the "industrial committee?" If too many occupations were brought in, the committee would be unwieldy and would be stalled by conflicting interests within its own walls. The Administrator first placed cotton, rayon and silk in the textile committee. Then some knit lines applied to be admitted, and much conversation will be burned up before an agreement is reached. The committee's job will be to determine three to a half dozen minimum wage rates above the 25-cent statutory minimum. That may take six months or more. Meanwhile the metal-working industry, although it will not be called upon to set minima under the law for a long time, is making useful observations of what goes on. And the Administrator, who so far is making a fine impression on everybody, is adding to his experience.

Anti-Monopoly Course

Steering the Justice Department's survey of the steel industry, Assistant Attorney General Arnold is said here to be seeking genuine economic results rather than a hollow legal victory. The survey, helped along by recent modifications of the basing point system, may lead eventually to some prosecutions or to revision of the anti-trust laws. A. A. Berle, first-flight brain truster and until recently assistant secretary of state, said in his renowned memo to the Dies committee that maybe mere bigness is not always bad; a lot of little local monopolies might be worse. Mr. Arnold may con these ideas, even if the Administration does not. Anyway, Berle seems to have stated the hefty problem that has to be dealt with.

Fight on Wagner Act Looms

A fight in next congress over (1) confirmation of NLRB member Donald Smith, re-appointed by the President for five years over bitter protest of AFL, and (2) amendment of the labor relations act itself, is considered inevitable. Mr. Roosevelt blasted CIO and AFL almost in the same breath by agreeing with William Green that changes in the act were necessary, and then by re-appointing Smith. The President is willing to talk turkey with AFL, what with the political wind blowing that way, but he could hardly take Mr. Green's dictation on Smith. In fact some say that AFL's ultimatum on Smith made it next to impossible for FDR to do else than he did. AFL is feeling chesty and will sound out conservative congressmen between now and the union's Fall convention, for support in its fight against the Board and the Act.

Billions for Defense

Air defense must be greatly accelerated and the Army's mechanization program must be pushed at top speed, says Secretary of War Harry H. Woodring in the 75th anniversary issue of *Army and Navy Journal*, published here. Brig. Gen. Leslie J. McNair declares, at the same time, that Third Army maneuvers showed urgent need for anti-mechanized weapons. All this indicates congress will be asked in 1939 for even more than the $450,000,000 Army appropriation this year, and the country will be in no mood to trim preparedness budgets. Likewise no one doubts that, after the usual opposition by those who believe this country is in no danger, congress will give Admiral William D. Leahy the $200,000,000 he wants to add to next year's building program, bringing the total to more than $800,000,000. Some think the total defense figure may reach a billion. This move was expected, as part of the President's big navy bill last session, authorizing the navy to build up to treaty strength.

Arthurdale Tractors

Farm machinery men in the Capital are not excited about the "yardstick" tractor plant set up with a $325,000 federal loan at Arthurdale, W. Va., site of Mrs. Roosevelt's experimental community. For one thing, part-time industrial employment prevails in the plant. And it's not strictly government; it's operated by a group of midwest cooperatives, growth of which is proving steady but slow.

Minimum Steel Wages

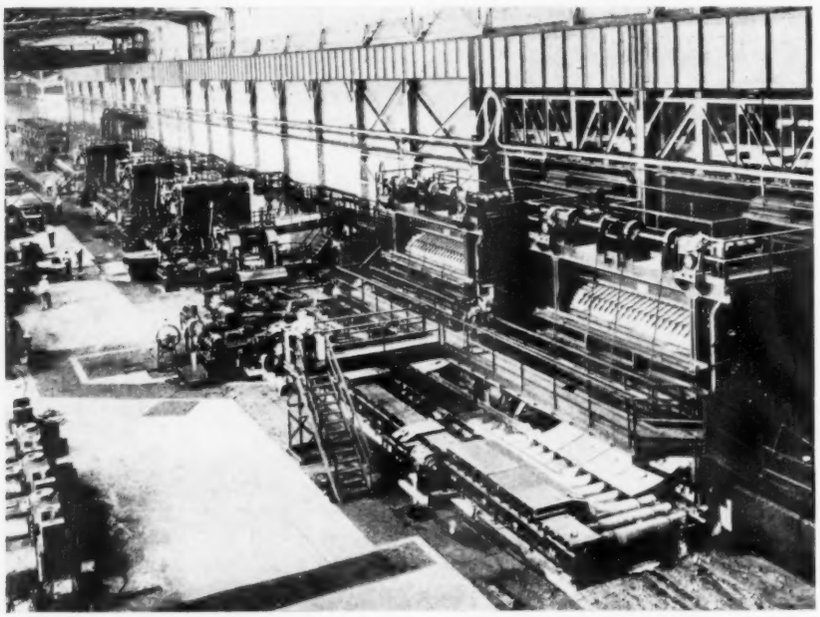
Public contract steel wage rate proposals from Labor's Walsh-Healy Board are expected in ten days or two weeks. The 62½-cent and 56-cent rates anticipated by the press are as good as any guesses, but not reliable. In addition to big steel differentials there might be rates also for small outfits which would find it an undue burden to change their present rates. Pittsburgh doesn't see how its rate can reasonably be raised. Industry men here think the board is fair minded and careful. The board will submit proposals to firms to think over. Sufficient protest, presumably, would cause it to reconsider.

THAT BREATHING SPELL

That the New Deal will give business somewhat of a breathing spell has been a foregone conclusion for some time, and the results of some of the recent elections would indicate the rumor is about to become an actuality.

The recent New Deal reverses make it more necessary than ever to improve the business outlook between now and 1940. If these are followed by defeat in Maryland and Georgia, more reliance than ever will have to be placed on booming business to reduce discontent and allay opposition. Since it is apparent that the New Deal cannot afford to make any new enemies or goad existing ones to greater activity, a much more conciliatory attitude is expected.

Washington observers look for redoubled efforts to force out federal funds faster, and anticipate considerable encouragement of the electric utilities and other activities to embark upon buying programs.



For Rolling Sheets Faster—This 44-in. continuous strip mill has just been put into operation at the Indiana Harbor plant of the Inland Steel Co. Capable of rolling a mile of steel over a yard wide in two and a half minutes, it includes among its control equipment a recording optical pyrometer which checks the temperature of the strip before it enters the six finishing rolls

Tool Engineers Society To Meet in October

DETROIT—An unusual variety of trips to plants in the Pittsburgh area will be a feature of the semi-annual meeting of the American Society of Tool Engineers, according to Ford R. Lamb, executive secretary of the organization. The meeting is expected to attract thousands to Pittsburgh when the society convenes for two days starting October 14.

One of the high spots of the meeting will be an address by J. H. Van Deventer, editor of *Iron Age*. In addition to the dinner and technical sessions, the feature portion of the program will include trips through the plants of the Aluminum Co. of America, U. S. Steel Co., Westinghouse Electric and Manufacturing Co. Mellon Institute, Mesta Machine Co., Heppenstall Co. and the Firth-Sterling Steel Co. The choice of these plants was influenced by the desire to give visiting society members views of types of manufacturing methods differing from those in common use in machine shops and mass-production plants.

Following is the tentative program as announced by the society:

FRIDAY, OCTOBER 14

9:00 A.M. Registration—Hotel William Penn, Pittsburgh.

9:30 A.M. Start Plant Visits.

6:30 P.M. Semi-Annual Dinner, Chatter Box Room, William Penn Hotel.

8:00 P.M. Semi-Annual Meeting and Technical Session. Tools, Taxes and Wages—J. H. Van Deventer, Editor, *Iron Age*.

SATURDAY, OCTOBER 15

10:00 A.M. Technical Session—Urban Room, William Penn Hotel. Industrial Advancement Through Scientific Research—L. W. Chubb, Director of Research Engineering, Westinghouse Electric & Manufacturing Co.

2:00 P.M. Industrial Sound Pictures—Urban Room, William Penn Hotel.

RFC Industrial Loans Continue Climbing

WASHINGTON—The steady increase of Reconstruction Finance Corporation loans to industry is continuing; July's loans totalled $21,835,480 as compared with the June total of $17,656,760. The present rate is in direct contrast to that of only four months ago, when April loans amounted to only $5,103,880, and to that of May, when they totalled barely $13,091,802.

Among the large loans made during July for metal working industries, the following are outstanding: A loan for $1,000,000 was made the Busch-Sulzer Bros. Diesel Engine Company of, St. Louis. A loan of $750,000 was made to the North American Car Corp., of Chicago; the McLouth Steel Corp., of Detroit and the Pittsburgh Steel Foundry Corp. were advanced $250,000 each.

Contract Awarded for Largest Generators

WASHINGTON — The Westinghouse Electric & Manufacturing Co. of Denver has been awarded the contract for the construction and installation of three huge generators for the Grand Coulee dam in the state of Washington. Largest in the world, each 108,000-kva. machine exceeds by 25,500 kva. the capacity of any of the mammoth generators in the Boulder Dam power house. Contract price for the equipment was $2,611,000.

Jap Army to Import Machine-Tools

TOKYO—Japanese military authorities, in an effort to reduce the cost of ordnance purchases, are planning to import a great number of machine tools through the Japanese Army's New York office. Plans are also under way for importing machines for lending or reselling to munitions manufacturers.

Officially it is explained that this procedure will relieve the machinery importers of the cumbersome routine of obtaining military indorsements for import applications. While industrialists catering to the army have no objection to this scheme, importers are indignant at this attempt to "short circuit" them.

American and British Institutes to Hold Joint Meeting

NEW YORK—At the invitation of the American Iron and Steel Institute and the American Institute of Mining and Metallurgical Engineers, two British organizations, the Iron and Steel Institute and the Institute of Metals, will hold a three-weeks joint Fall meeting in this country.

The meeting is scheduled to open in New York City on the afternoon of October 3 with a general session held at the Engineering Societies Building. This will be followed by a banquet given at the Hotel Waldorf-Astoria the same night.

The morning of October 4 will be devoted to technical sessions, with the societies convening in the Astor Gallery of the Waldorf-Astoria. For the remainder of the meeting, two separate programs have been prepared for the visiting delegates: one for those primarily interested in ferrous metallurgy, the other for those whose chief interest lies in the production of nonferrous metals.

Educational Program Becomes Effective

WASHINGTON—The War department announced that President Roosevelt has given his approval to the current fiscal year's program of educational orders and has made $2,000,000 available for carrying on the work. As authorized by the 75th Congress, a total of $10,000,000 will be spent over a five year period for the purpose of familiarizing manufacturers with some of the more difficult problems of munitions production, with the expectation that this procedure will help eliminate one of the major bottlnecks in munitions preparedness.

Assistant Secretary of War Louis Johnson pointed out that the policy in executing the educational orders program will be one of complete cooperation with industry. One objective of the program is to obtain in peace time those dies, jigs and fixtures the lack of which would cause considerable delay to munitions manufacture in the event of a war emergency. It is intended for this equipment to become the property of the government upon completion of the educational order, to be stored until needed.

In selecting items to be included in the program, the board of army officers appointed for the purpose considered only those articles in the essential category which are likely to remain standard for a considerably length of time. It was also considered advisable that the articles be used exclusively for military purposes and required in such large quantities or so complicated in character that "education" of industry in their production is deemed essential.

In keeping with the above requirements, the board has selected the following items to comprise the program approved for the current year: U. S. caliber #.30 Mi. semiautomatic rifle; 3-in. anti-aircraft gun recoil mechanism; 75 mm. shell forging; 75 mm. shell machining; gas mask and 60-in. searchlight. Additional articles may eventually be included in this year's program if recommended by the board and approved by the President.

Proposals will soon be sent to selected firms requesting bids on the above items. Under the act authorizing the educational orders, bids can be invited only from those concerns which, in the judgment of the Secretary of War, will be competent in time of war to manufacture the particular munitions considered.

PERSONALS

E. G. MANSFIELD, formerly vice-president and treasurer of Samuel C. Rogers & Co., manufacturers of automatic knife and saw grinding machinery, was recently elected president. Mr. Mansfield, who has been actively identified with the business for the past 25 years, succeeds OLIVER CABANA, JR., prominent Buffalo industrialist, who died early this year.

E. G. MANSFIELD

J. C. BARNABY, former manager of Worthington Pump & Machinery Corp.'s oil and gas engine application division at Buffalo, N. Y., has been placed in charge of special engineering work covering engine research and design.

JOSEPH E. BAYNE has been made director of sales, Chrysler division, Chrysler Corp., according to an announcement by C. L. JACOBSON, sales manager. Prior to his recent appointment, Mr. Bayne was head of the factory branch of the Chrysler Detroit Co.

GARDNER W. CARR, president of Menasco Manufacturing Co., Los Angeles aircraft engine concern, has assumed direction of production for his company, following the recently announced resignation of A. S. MENASCO.

J. R. FUNK, service engineer for the Landis Machine Co., Waynesboro, Pa., is traveling by plane through South America servicing Landis oil field and industrial shop equipment. His work in Oklahoma, where he was previously stationed, will be taken over by WILLIAM B. BAKER.

FLOYD T. HAGUE has been named manager of engineering of the steam division of the South Philadelphia works of the Westinghouse Electric & Manufacturing Co. Mr. Hague was previously manager of the D. C. engineering department of the company's East Pittsburgh works.

FRANK HOWELL STOHR, manager of the generator division of the Westinghouse Electric & Manufacturing Co., has been named manager of the recently combined generator and transportation divisions of the company, according to an announcement from R. B. MILDON, vice-president in charge of the Pittsburgh district works. FRANK B. POWERS, formerly manager of transportation engineering, has been appointed engineering manager of the combined divisions.

RAY LEGG, manager of the Kelvinator national direct sales division, has been promoted to the post of general sales manager of the Leonard refrigerator division of Nash Kelvinator Corp., according to an announcement byy GEORGE W. MASON, president.

ART MERRY has been appointed district factory representative of the Ex-Cell-O Corp. Working with engineers in all parts of the country, Mr. Merry will aid in the development of new products of the company's continental tool works division.

J. H. RIDDLE has been named manager of the warehouse opened by Milcor Steel Co., Milwaukee, at Atlantic Ave. and Greenleaf St. in Rochester on September 1. Mr. Riddle has been with the company for 25 years.

J. EDWARD WEIT has been elected president of the Atlas Bolt & Screw Co., Cleveland. Identified with the company since 1900, he has been vice-president and sales manager.

BUSINESS ITEMS

Allis-Chalmers Manufacturing Co. has moved its district office in Dallas, Texas, to a new location where the power, electrical and industrial divisions of the company now occupy an entire building.

Buick division of General Motors Corp. is beginning construction of a new service parts building. Providing 350,000 sq. ft. of floor area, the new structure will be erected on the site of two obsolete buildings razed to make way for it.

The Charles Bond Co., manufacturer of materials handling equipment, celebrated in Philadelphia the 50th anniversary of the company's founding.

The Farrel-Birmingham Co., Inc., has begun construction of additional foundry building space at its Ansonia, Conn., plant. The new building, which will add 4,000 sq. ft. of floor area to the foundry facilities, is expected to be completed by December.

The R. G. Haskins Co., manufacturer of flexible-shaft equipment and high-speed tapping machines, has moved to its new building at 615 South California Ave., Chicago, Ill., where additional manufacturing facilities are available.

The Ingersoll-Rand Co. has been awarded contracts for the condenser, condenser pumps and boiler feed pumps for the 18,500-ton all-welded tanker to be built for the Atlantic Refining Co.

Timken Rolling Bearing Co. has opened offices in Washington, D. C. to assure government officials of immediate technical service. The new office will be under the direction of A. L. CAMPBELL, who has been connected with the engineering staff of the company since 1929.

Machinists Tool Grinding & Mfg. Co., now at 3038 W. Van Buren St., Chicago, has purchased a two-story factory building at 2834-36 W. Lake St.

Metallizing Co. of America, Inc., manufacturers of Mogul metalizing guns, has consolidated its New York and Chicago offices into a central office at Chicago, under the direction of E. T. PARKINSON, formerly manager of the company's San Francisco office.

Parsons Co. has quadrupled its manufacturing capacity by acquiring the former Ford Motor Co. plant at 15000 Oakland Ave., Detroit. The company manufactures all-steel kitchens, auto parts, monel sinks.

Skilsaw, Inc., portable tool manufacturer, has begun construction on a new factory and office building in Chicago.

The Straight Line Engine Co. and the Direct Separator Co., both of Syracuse, N. Y., have been merged to form the Straight Line Foundry & Machine Corp. The business of each will be continued as before under the Straight Line division and the Direct Separator division, respectively, of the new corporation.

OBITUARIES

C. PARKER HOLT, executive vice-president and director of Caterpillar Tractor Co., and for 40 years affiliated with it and one of its predecessors, the Holt Manufacturing Co., died the morning of Aug. 24 at his home in Piedmont, Cal.

Mr. Holt was graduated from the University of California in 1902, after which he engaged in post-graduate engineering study at Cornell University. In 1905 he became a vice-president and director of the Holt company, and in 1913 became treasurer, continuing also as a member of the board. When the Caterpillar Tractor Co. became successor to the Holt company in 1925, he was appointed export manager, from which position he advanced to that of vice-president within a year. In 1934, Mr. Holt became executive vice-president, moving his office from San Leandro, Cal., to Peoria, Ill. He continued in this capacity until 1937, when he returned to California after a serious illness.

During his stay at Peoria, Mr. Holt was his company's representative in the National Association of Manufacturers, and was honored by appointment as chairman of the committee on government relations with industry.

VINCENT W. ALLEN, assistant works manager of the Bridgeport Brass Co., died Aug. 25 in Waterbury, Conn. He was 49 years old, and had been in the brass industry for 28 years.

FLOYD JAMES ANDERSON, for ten years production manager, Bower Roller Bearing Co., Detroit, died August 20 at the age of 42. He had been with the company for 22 years.

BIDDLE ARTHURS, 72, former president of the Simonds Gear & Manufacturing Co., Pittsburgh, died recently following an extended illness.

C. PARKER HOLT

JOHN W. BUNTING, 56, vice-president of the Bunting Brass & Bronze Co., Toledo, Ohio, died Aug. 18 following a month's illness. He was the son of the company's founder.

WHITFORD DRAKE, 55, president, Electrical Research Products, a subsidiary of Western Electric Co., died August 24.

Mr. Drake joined the Western Electric Company in 1924 as assistant operating superintendent of the Kearny Works. Later he was made operating manager of the commercial department of the company. He joined Electrical Research Products upon its formation in 1927, becoming vice-president in 1928 and president in 1937.

F. VICTOR HENDRICKSON, 50, for the past eleven years night superintendent of the National Forge & Ordnance Co., Irvine, Pa., died Aug. 26.

WILLIAM L. HOSLER, 76, for many years president of the Buckeye Traction Ditcher Co., Findlay, Ohio, died Aug. 20 at his home in that city following a long illness.

DR. FRIEDRICH OPEL, son of Germany's foremost automobile manufacturer, died of heart disease in Vienna on August 30.

CARL L. PFEIFER, treasurer since 1916, Chain Belt Co., Milwaukee, died August 24 at the age of 57.

JAMES ALLEN ROBERTS, 80, retired steel company official, died Aug. 27 at his home in Chicago. He was at one time an associate of J. W. GATES in Consolidated Steel & Wire Co., and before his retirement a year ago he was an executive of Pittsburgh Steel & Wire Co.

LOUIS SCHNIEBLE, treasurer, Milwaukee Parts Corp., machinists, died August 19 at the age of 69. He had been with the company fifteen and treasurer for the past ten years.

MEETINGS

AMERICAN FOUNDRYMEN'S ASSOCIATION. Michigan Union Building, Ann Arbor, Michigan, September 15, 16 and 17. Committee Chairman, PROF. RICHARD SCHNEIDEWIND, University of Michigan.

AMERICAN GAS ASSOCIATION. Twentieth annual convention, Oct. 10-13, Atlantic City, N. J. ALEXANDER FORWARD, managing director, 420 Lexington Ave., New York City.

AMERICAN GEAR MANUFACTURERS ASSOCIATION, Skytop Lodge, Pocono Mountains, Pa., Oct. 10, 11 and 12. Secretary of the Association: J. C. MCQUISTON, Shields Building, Wilkinsburg, Pa.

AMERICAN HOT DIP GALVANIZERS ASSOCIATION. Semi-annual meeting, Aug. 25 and 26, Statler Hotel, Cleveland. STUART J. SWENSSON, secretary-treasurer.

AMERICAN IRON AND STEEL INSTITUTE and AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS. Joint Meeting with two British Institutes: THE IRON AND STEEL INSTITUTE and THE INSTITUTE OF METALS, Hotel Waldorf-Astoria, New York City, beginning Oct. 3.

AMERICAN SOCIETY FOR METALS. Twentieth Annual Metal Show and Exhibition. Convention Hall, Detroit, Oct. 17–21. W. H. EISENMAN, secretary, 1016 Euclid Ave., Cleveland, Ohio.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS. First Fall meeting, Biltmore Hotel, Providence, R. I., Oct. 5-7. Society secretary, C. E. DAVIES, 29 W. 39 St., New York City.

AMERICAN WELDING SOCIETY, Nineteenth Annual Meeting, Book-Cadillac Hotel, Detroit, Mich., Oct. 16-21. Society secretary, M. M. KELLY, 29 W. 39 St., New York City.

AMERICAN SOCIETY OF TOOL ENGINEERS. Semi-annual meeting, Oct. 14–15. Pittsburgh, Pa. FORD R. LAMB, executive secretary, 2567 W. Grand Blvd., Detroit.

ASSOCIATION OF IRON AND STEEL ENGINEERS, Annual Convention and Exposition, Cleveland, Sept. 27-30. Convention at Hotel Statler, exposition at Cleveland Public Auditorium.

NATIONAL ASSOCIATION OF FOREMEN, Dayton, Ohio, October 14, 15 and 16.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION. Annual Meeting. Oct. 24-28. Palmer House, Chicago. J. W. DONALD, managing director, 155 E. 44 St., New York City.

NATIONAL SAFETY COUNCIL. National Safety Congress, Oct. 10–14. Stevens Hotel, Chicago. Council secretary, H. J. GRIFFITH, Jones & Laughlin Steel Corp., Pittsburgh.

PORCELAIN ENAMEL INSTITUTE. Third annual forum, October 12–14. University of Illinois, Urbana, Illinois, Committee Chairman, F. E. HODEK, JR., General Porcelain Enameling and Manufacturing Co.

Eighth annual meeting, October 25 and 26. Cleveland.

SEVENTH INTERNATIONAL MANAGEMENT CONGRESS, Washington, D. C. Sept. 19–23.

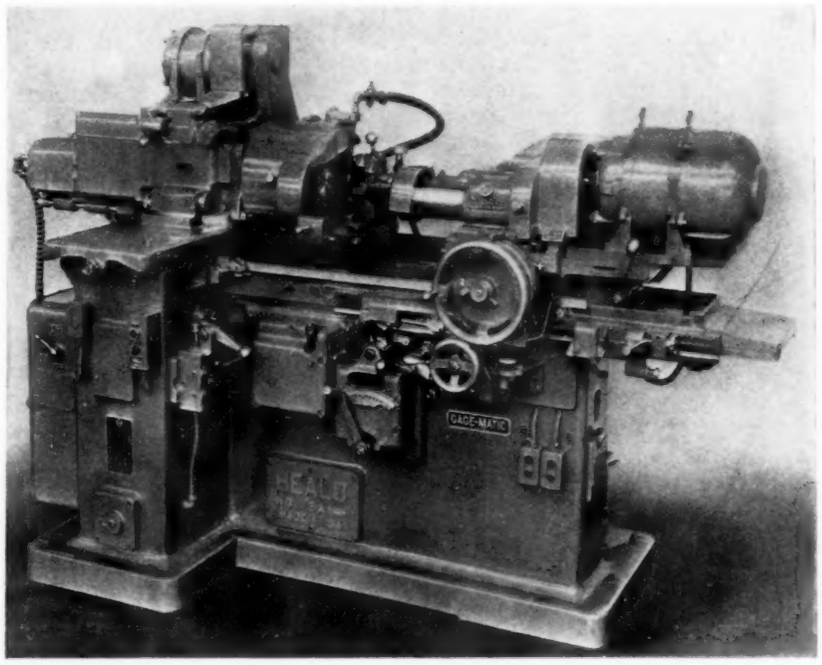
SOCIETY OF AUTOMOTIVE ENGINEERS.

National truck, bus and rail car meeting, Oct. 4 and 5, Chicago.

National regional fuels and lubricants meeting, Oct. 6 and 7, Tulsa, Okla.

National aircraft production meeting, Oct. 13–15, Ambassador Hotel, Los Angeles, Calif.

SHOP EQUIPMENT NEWS



Heald No. 72-A-3 T-Base Internal and Face Grinder

Both internal and face grinding operations can be performed at the same setting with the No. 72-A-3 T-base grinder, offered by The Heald Machine Co., Worcester, Mass. The machine is designed to grind first the internal bore in a fully automatic "Gage-Matic" cycle and then, without re-chucking, grind the adjacent external face in a plunge cut, using a separate cup wheel. By this method, the face is claimed to be ground absolutely square with the bore. The bore itself is held consistently to close limits because of automatic sizing.

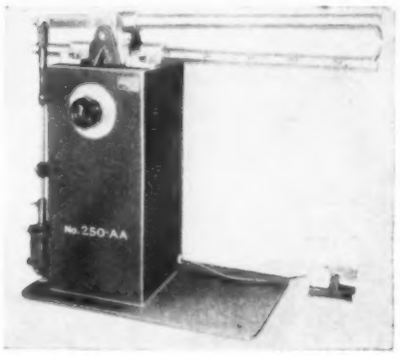
Basically, this grinder is similar to the standard "Gage-Matic" with the difference that two separate wheelheads for both hole and face grinding are mounted on the wheelhead cross slide. Workhead is mounted on a hydraulic cross slide at the end of the machine in order to index the work from hole grind to face grind. Base has a T-section at the left end to support the workhead cross slide. Both wheelheads are driven by a single motor from an idler pulley which drives the front head through multiple V-belts and the rear head by a flat belt. Each head is driven at different speeds to provide the most efficient cutting action on each surface.

Movement of the work slide is controlled by a hand-operated hydraulic valve at the front of the machine within convenient reach of the operator. For grinding the hole, the cross slide is indexed to the rear and for face grinding it is indexed to the front. Position of this slide is controlled by accurate stops. As the cross slide indexes from one position to the other, hydraulic valves function automatically to slow down the rate of cross slide travel so as to cushion the stops against shock. Safety limit switches are provided to prevent the table from running forward unless the cross slide is in either extreme front or rear position. Conversely, the cross slide cannot be indexed until the table is almost out to rest position.

Eisler "Universal" Adjustable Spot Welder

The Eisler Engineering Co., 745 S. 13th St., Newark, N. J., has announced development of a line of "Universal" long-horn spot welders for deep sheet-metal work. Both the upper and lower horns may be lengthened or shortened for the work at hand. The horns are marked to show the rating of the welder for the given horn adjustment.

These welders are made in foot, air or motor operated models and will weld from 30 to 150 spots per min., depending on the type of work being done. There are three sizes, having 2, 2½ and 3 in. diameter arms

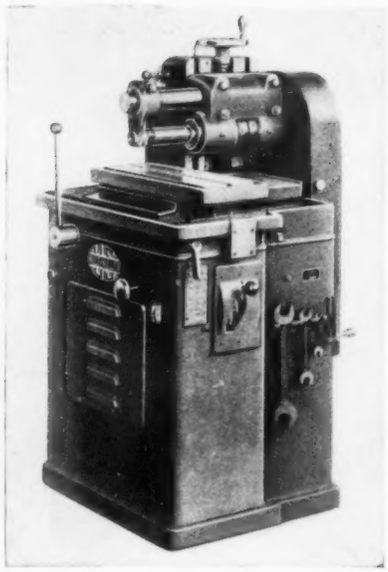


which are 30, 36 and 40 in. long. Model No. 225AA has ratings of 5, 10, 15 and 25 kva.; Model No. 250AA is rated at 25, 30, 35, 40 and 50 kva., and Model No. 275AA is rated at 40, 50, 60 and 75 kva.

U. S. Model MM-5 "Multi-Miller"

Increased capacity is offered in the Model MM-5 "Multi-Miller" announced by U. S. Tool Co., Inc., Ampere, N. J. Rotary, contour, climb and continuous milling operations can be performed on this machine. Table feed has been increased to 6 in. and the machine is designed for a 1 hp. spindle drive motor. These machines are designed to be set close together to facilitate efficient loading and for space economy.

A cam-operated feed is used for

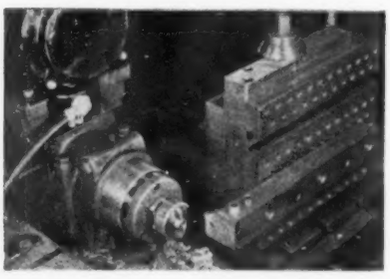


the table, this permitting correct table speeds to be used in all parts of the cycle. Approach, cutting and return speeds are established easily to meet the requirements of the job. Table cycles ranging from 5 sec. to 2 min. are obtainable with standard one, two or three lobe cams. There are eight table speeds available for each cam.

Ex-Cell-O "Universal" Precision Fixture

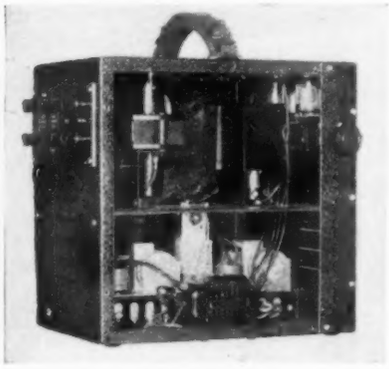
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich., has developed a universal fixture for use on precision boring and facing machines in order to facilitate these operations. Fixture is provided with several T-slots and a number of rows of staggered capped holes. It may be used for mounting either the work, the tool bar or a subfixture. Upper part of the fixture may be mounted on the cross slide at right angles or parallel to the spindle, alignment keys being provided for this purpose. A precision ground lead screw is provided for the cross slide.

Fixture is designed primarily for manual operation, but may be equipped with a hydraulic cylinder to control transverse fixture movement. A set-up for facing and inside chamfering a valve key for an airplane engine is shown. Tool bar is mounted on the fixture and the part is held in the spindle of the machine in a simple centrifugal chuck having two fingers which engage the tapered diameter of the part as the spindle rotates.



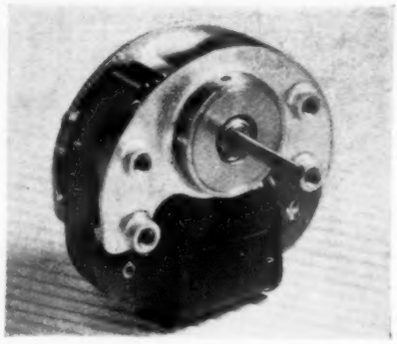
G. E. Contact-Making Galvanometer

A portable photo-electric contact-making galvanometer has been developed by General Electric Co., Schenectady, N. Y., to operate controlling circuits or to sound alarms. The instrument operates from any 60-cycle lighting circuit. The most general application of this unit lies in the field of temperature measurement and control. A sensitivity as high as 2.2 microvolts per division is obtainable.



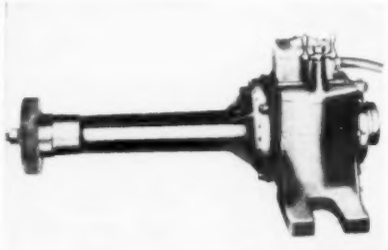
"Barcol" Type YAr Shaded-Pole Motors

Available in three frame sizes covering an output range from 0.005 to 0.026 hp., the Model YAr small electric motors offered by Barber-Colman Co., Rockford, Ill., are built to operate on 105-120 volts, 60 cycles, a.c. These motors have self-aligning, oil-and-graphite impregnated bearings and wick type oilers. Shaft is of hardened stainless steel.



Wodack Internal Grinding Heads

Built to the same specifications as to the tool post and angle plate grinders previously described, the internal grinding heads announced by Wodack Electric Tool Corp., 4627–29 W. Huron St., Chicago, Ill., have a 12-in. shaft extension for grinding cylinders, journals or similar work. These units are equipped with vertical feed only, as shown, or with combined vertical and horizontal feed arrangement.



Cone Six-Spindle "Conomatic"

Time required for placing any attachment in operation is said to be reduced in the improved 1¼ and 1½ in. six-spindle "Conomatic" machines announced by the Cone Automatic Machine Co., Inc., Windsor, Vt. The high and low speed cam action may be disconected by the operator when checking tools. Power feed engagement is instantaneous and can be controlled from either side of the machine. Countershaft for power feed provides a wide range of speeds and a slow speed for tooling that can be moved instantly to high or production feed. Power feed reverse makes the handwheel unnecessary and decreases tool-up time.

Two formers and a cut-off tool are held in the front slide, while three forming tools are operated in the rear slide. Six end working positions are provided by the cylindrical turret and two independent end positions are supplied by the semi-turret. This also operates the stock stop arm and is said to eliminate stock rebound. Two more independent end stations are provided by the auxiliary spindle attachments.

Cross slides are arranged with two independent feeds, thus giving three forming positions on both sides of the machine. Frame construction is of the double bed type, having a lower base and a heavy overhead bed in

"Buffalo" ANNOUNCES *an important* NEW DRILL

No. 16

POWER FEED

DRILL

● It has been added to our large and distinguished family of drills to fill the need for a substantial positive gear drive, positive clutch type power feed for a No. 2 Morse taper drill.

There are no belts, no friction members, no fancy gadgets to get out of order.

It offers these advantages:

Feed engaged by feed motion handle.

Feed disengaged by upward motion of handle.

No adjustment required on feed.

Feed "Take-off" full geared.

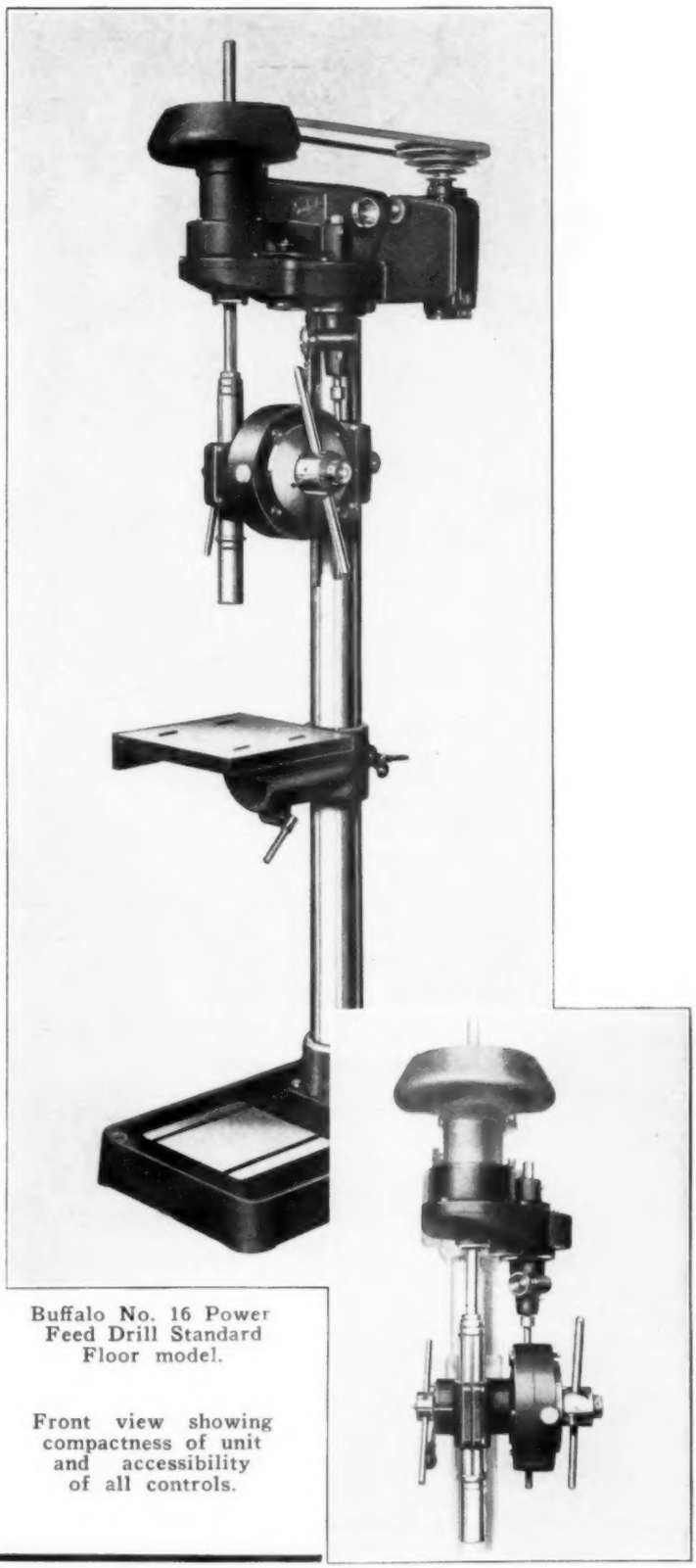
Front reading depth dial.

Front depth control.

Front reading feed dial.

Feed change may be made while machine is running.

If you need a power feed drill, get the facts on the new Buffalo No. 16. Write for new Bulletin 3122.



Buffalo No. 16 Power Feed Drill Standard Floor model.

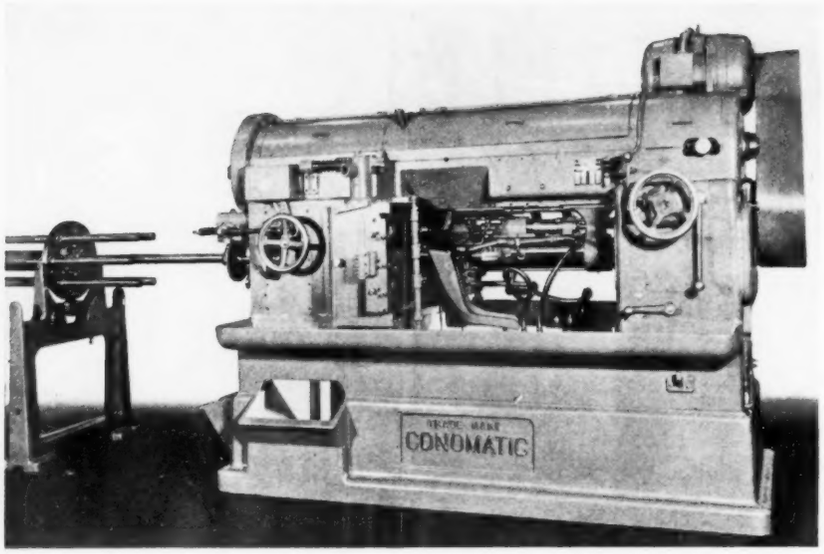
Front view showing compactness of unit and accessibility of all controls.

BUFFALO FORGE COMPANY

448 Broadway Buffalo, N. Y.

Branch Engineering Offices in Principal Cities

In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ont.



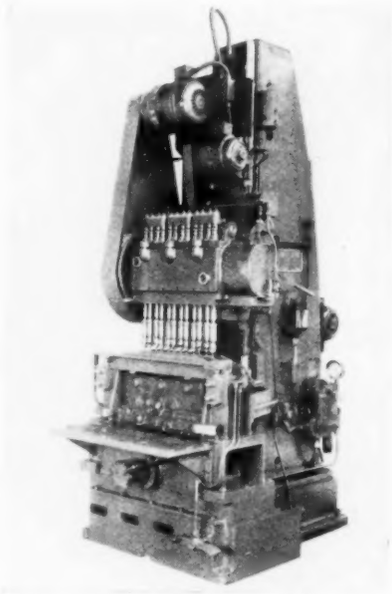
which the cam drums are mounted. Specifications: swing over tool turret, 5 in. diameter; turning length, 6 in.; distance from floor to loading position, 45 in.; distance from floor to center of machine, 45 in.; over-all height without motor, 67 in.; over-all length without reel, 122 in.; net weight, 16,500 lb.; over-all width, 56 in.; motor size, 15 hp.

Moline No. 114-D Hydraulic Drill

Specially arranged for chamfering valve seats and finish counter-boring exhaust valve insert holes in automotive cylinder blocks, the No. 114-D hydraulic feed drilling machine announced by The Moline Tool Co., Moline, Ill., is equipped with an air-operated holding fixture which is loaded from the front of the machine. An air-cylinder operates a toggle and wedge lock mechanism to clamp the block securely against the stationary top plate of the fixture. Since the depth of the exhaust valve counterbore must be gaged from the top of the cylinder block, it is necessary that this method be used.

When in operation, the hydraulic pump feeds the entire moving carriage down to a predetermined positive stop, at which point the hydraulic pressure holds the carriage stationary and a small motor, mounted directly over the main drive motor, starts automatically to rotate three cams which feed the tools into the work.

The twelve spindles, which are rotated by standard Moline drives, are arranged in three groups of four each. Each group is actuated by a single cam. Cams are set in such a way that all three groups of tools do not start to cut simultaneously, but are fed in and brought back with a slight time lag between similar portions of the cutting operations. These cams are so designed that each group of spindles is fed down and an initial rate of 0.013 in. per revolution, followed by 0.003, 0.008 and 0.004 in. per revolution and ending with a dwell. When the cams have finished



their movement and the tools have been withdrawn, the small motor stops automatically and the carriage is returned hydraulically to the starting position. Pushbutton control is provided on the fixture. Production is 75-80 blocks per hour.

B-C Combination Cutter Sharpener

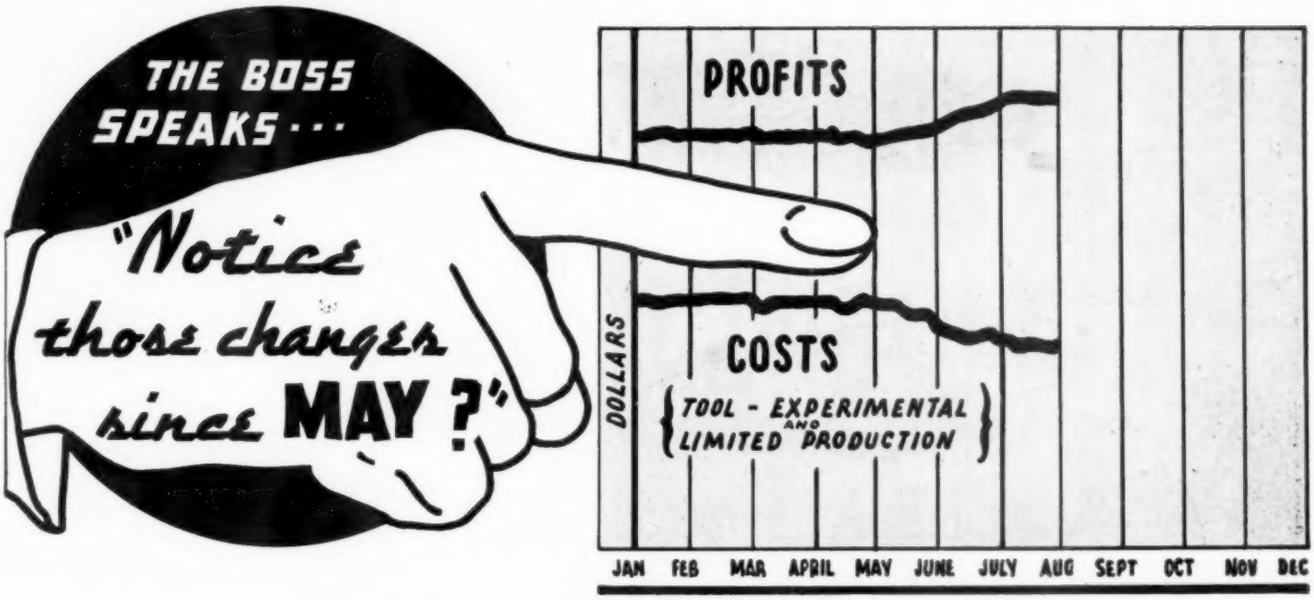
Practically all types of hobs and reamers, as well as many types of milling cutters, can be sharpened on this combination grinder developed by Barber-Colman Company, Rockford, Ill. Positive mechanical control is provided for following spiral leads, indexing, diameter size, blade profiles, feed to wheel on two-face grinding, diameter cutting clearance, release clearance, wheel dressing, and radial faces on high spirals. All mechanical movements of the machine can be duplicated to assure uniformity of work on a number of pieces. Base of the machine is a box-section casting, set on three milled feet to eliminate vibration and provide a solid foundation regardless of floor irregularities. This base contains the electric control panel, the coolant sump and

pump, and settling reservoirs for the returned coolant.

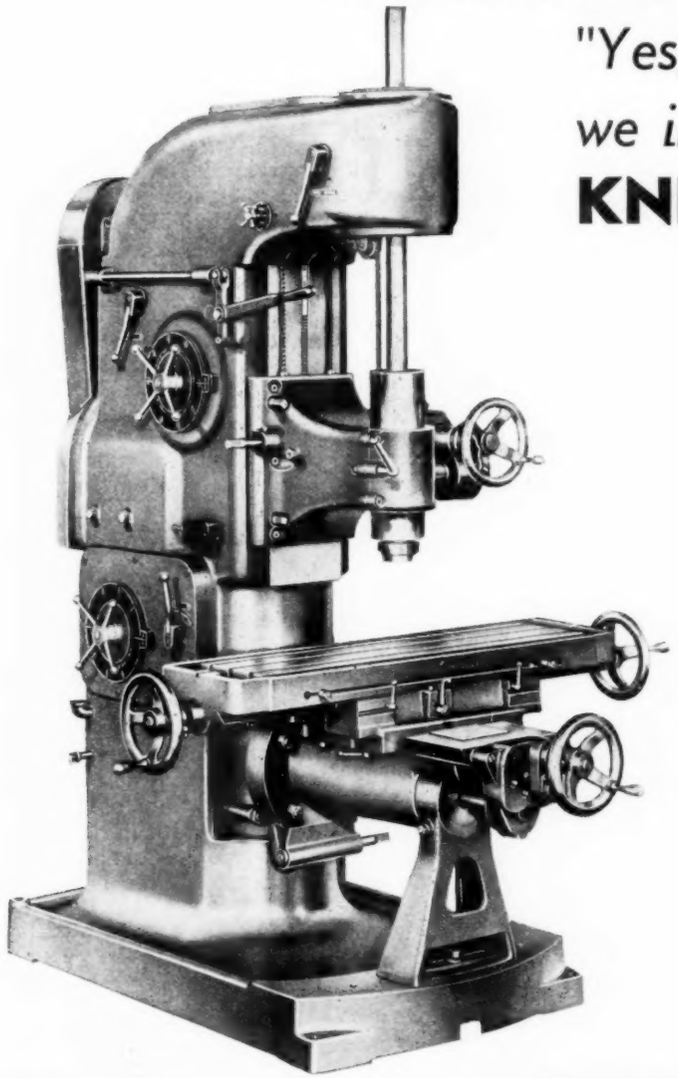
The index head contains, in its base, a tangent bar and follower for rotating the work to coincide with the lead of its blades or gashes. This bar is adjustable with a vernier protractor for leads of 6-in. and up, either right- or left-hand. The pull bar anchor holds the follower cage in fixed position during the stroke. Index setting is accomplished by clamping adjustable lugs on the rim of a notched index plate. Odd spacings up to 15 and even spacings up to 20 can bet set quickly and accurately. Irregular spacings are set to conform with the actual spacing of work blades.

Spindle can be raised or lowered by swinging the entire head up or down, to one side or the other, in trunnions, using a crank on the shaft. Yoke supporting the wheel head can be swivelled to bring the wheel at the proper angle for the lead of the gash on the work. Grinding wheel is advanced or withdrawn by a handwheel which has a dial on which the smaller graduations show a movement of 0.000125 in.

Specifications: Diameter capacity


THE BOSS SPEAKS . . .
"Notice those changes since MAY ?"
PROFITS
COSTS
TOOL - EXPERIMENTAL AND LIMITED PRODUCTION
DOLLARS
JAN FEB MAR APRIL MAY JUNE JULY AUG SEPT OCT NOV DEC

THE SUPER ANSWERS . . .



"Yes, that is when we installed our new

KNIGHT MILLER"

Its ease of operation—fast method of changing tools and cutters, and quick change of vertical settings together with the savings made in layout time by quick and accurate locating with dial indicators and the "built-in jig" features have all helped to account for those curve changes since May.

Experience shows that the new Knight Miller is reducing costs on many kinds and types of operations. Investigate the profit value of a Knight Miller on your work.

KNIGHT VERSATILE MILLERS ACCURATE - RIGID

W. B. KNIGHT MACHINERY CO.
• ST. LOUIS, MISSOURI •

with cup wheel, 8 in.; diameter capacity with dish wheel, 6 in.; length of stroke with straight gash, 24 in.; length of stroke with highest spiral, 8 in.; maximum angle of wheel setting, 30 deg. R.H. or L.H.; maximum length between centers, 33 in.; grinding wheel spindle speeds, 3,000 and 5,000 r.p.m.; grinding wheel motor, 1 hp., 3,450 r.p.m.; coolant pump motor, ¼ hp.; over-all height with wheel spindle raised, 60 in.; floor space required, 100 x 44 in.; net weight 2,550 lb.

American Type H-2-30 Broach

The Type H-2-30 horizontal hydraulic pull-type broaching machine for light internal operations, offered by American Broach & Machine Co., Div. Sundstrand Machine Tool Co., Ann Arbor, Mich., has been improved to provide a fast return stroke. Hardened and ground steel guideways also have been added. This machine easily can be changed from one operation to another by changing work bushings, broach pullers and broaches. Suitable fixtures and tools can be mounted for surface broaching operations. Cycle is fast, as dual cylinders are used with ram connections to the draw head.

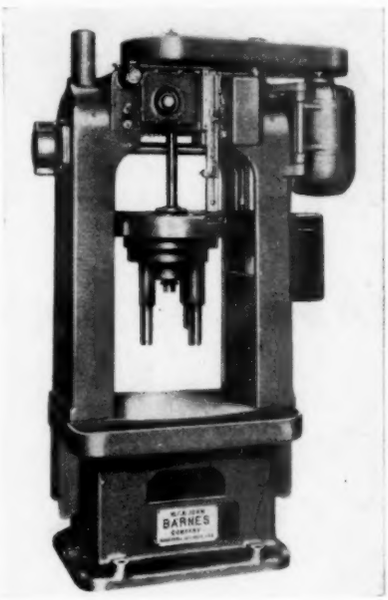
Specifications: normal capacity, 2 tons; maximum capacity, 4 tons; stroke, 30 in.; maximum over-all broach length, 33 in.; cutting speed, 28 ft. per min.; return speed, 48 ft. per min.; diameter of hole in face plate, 5 in.; distance between guide ways, 8½ in.; minimum distance from face plate to front of adjustable slide head, 3½ in.; distance from floor to center line of hole in face plate, 37 in.; normal operating pressure, 125 lb. per sq.in.; maximum operating pressure, 850 lb. per sq.in.; motor size recommended, 3-5 hp.; floor space required, 87 x 19 in.; over-all height, 42 in.; net weight, 2,500 lb.

Barnes No. 900 Hydraulic Drill

Developed particularly for multiple-spindle work in connection with indexing or stationary type fixtures and for operations in which the work is carried through the machine on a conveyor, the No. 900 vertical hydraulic drill developed by W. F. and John Barnes Co., Rockford, Ill., is actuated by two hydraulic cylinders mounted one on each side of the columns. Cylinders and bar guides are protected by chip guards. This machine has an automatic equalizer and counterbalance for properly counterweighting the multiple head.

Driver head or flange, for mounting the multiple head, is fastened to two large round hardened and ground bars which are guided in head bushings mounted in the flange. A Barnes hydraulic feed unit provides an automatic cycle of rapid approach, feed, adjustable dwell and rapid return to stop. This feed unit consists of a standard, constant-delivery, rapid-traverse pump and a variable delivery piston-type feed pump coupled with a standard Barnes control valve. The automatic cycle is obtained through solenoid actuation of the valve and in connection with standard trip dogs and a pushbutton starter.

Specifications: maximum feeding pressure, 8,200 lb.; rate of traverse, 188 in. per min.; rate of feed, 0-13 in. per min., stroke of head, 12 in.; distance from driver flange to table, 25 in. minimum, 37 in. maximum; table height from floor, 26 in.; distance between uprights, 26 x 24 in.; diameter of driver head, 22 in., spindle speed 607 r.p.m.; maximum motor size, 7½ hp. at 1,800 r.p.m.; height of machine, 90 in.; floor space required, 42 x 29 in.; approximate skidded weight, 4,000 lb.



Sundstrand "Oil-Power" Variable Transmission

A line of oil-power, variable-speed transmissions having a wide speed range has been developed by the Sundstrand Machine Tool Co., Rockford, Ill. It is claimed that these units develop high torque with smooth operation at slow speeds, as well as at higher speeds, and provide high mechanical efficiency throughout the entire speed range. Instant reversal is possible at high speeds on continuous duty and operating temperatures are said to be low either for continuous or intermittent duty.

Transmissions are housed in a small, compact case and consist of a variable displacement multiple piston type pump, a fluid motor of the multiple piston type and a simple control mechanism. Control may be auto-

WHICH ONE OF THESE COUPLINGS CAN YOU USE ?

Here are four types of couplings suitable for a wide range of application from "flea" power up to 600 horsepower — but the main point is — they're all carried in stock ready for immediate shipment.

1 This is what is known as the Renold-Hardy flexible coupling and is made up of a flexible disc of vulcanized rubbered fabric inserted between two metal flanges with hubs. It is available in various sizes capable of transmitting from 1 horsepower up to 600 horsepower.

2 This coupling is known as the type "FCN" three-jaw coupling and is made of a high grade, low carbon content steel with a non-metallic cushion between the jaws to absorb vibration or shocks. It is available in bore sizes ranging from $\frac{3}{8}$" to $1\frac{1}{2}$" diameter.

3 This coupling is known as the type "FA" multi-jaw coupling and is made of untreated steel. This coupling is particularly well suited for use with small displays or other light duty applications. It is available in bore sizes ranging from $\frac{3}{16}$" to $\frac{1}{2}$" diameter.

4 This coupling is known as the type "FCB" special ball bearing type flexible coupling and is made of case-hardened steel with an insert having hardened and ground steel balls. The greater flexibility of this coupling over an ordinary jaw coupling removes the strain between motor and machine, permitting unrestricted end play of motor shaft. It is available in bore sizes ranging from $\frac{3}{8}$" to $1\frac{1}{2}$" diameter.

One unique feature about these couplings is that they are all IN STOCK ready for your immediate use. Their complete specifications and list prices will be found on pages 251 to 255 of our General Catalog No. 52. If you would like to have a copy of this catalog, just let us know and one will be on its way to you by return mail.

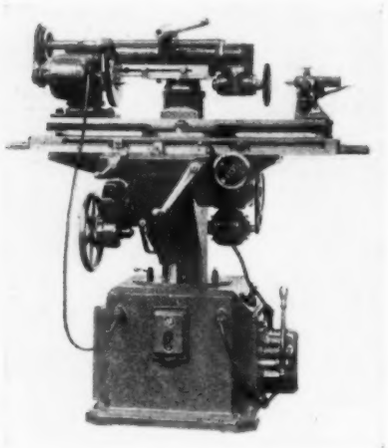
BOSTON GEAR WORKS, INC.
NORTH QUINCY, MASSACHUSETTS

matically or manually operated. The Model 5 HT unit shown is rated at 5 hp., and provides a speed range from 3 to 2,400 r.p.m. Additional sizes now available are a 2 and a 10 hp. unit.

LeBlond No. 3 Cutter Grinder

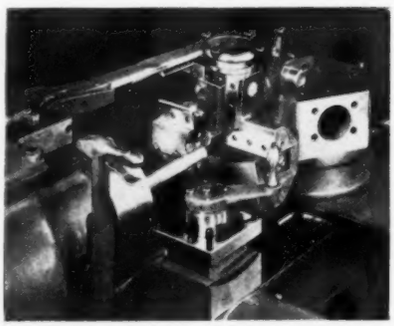
Three independent and coordinated planes of full circle movement of the wheel head makes the No. 3 universal cutter grinder announced by R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, fully flexible. Horizontal reciprocating housing for the universal wheel head is vertically positioned by adjustment of table height. It is horizontally operated by a control lever and locked in any position. Wheel spindle is driven by a spline shaft from a variable speed, motor-driven transmission unit in the base of the machine. Four spindle speeds of 3,100, 4,000, 5,100 and 6,500 r.p.m. are claimed to provide proper wheel speeds for all types of work.

Table of this machine is built in two parts, the upper or swivel table for setting angle relations of the work to the wheel and the lower or sliding table for horizontal movement of the work. Entire table construction for horizontal movement is mounted on the saddle, which provides a cross movement on the knee. The knee



can be adjusted vertically on the sleeve, which in turn can be rotated to any desired position around the stump. Knee adjustment or feed is geared to a large hand wheel for smooth vertical operation. Saddle is positioned horizontally on the knee by a ball crank screw feed.

Work head is independently motored with a variable speed driving unit. Face plate with center accommodates a chuck when needed. This head is mounted on the table in line with a quick-acting tail stock. A universal vise is provided for use on the table to hold work not carried between centers.



Gisholt Taper-Bolt Turner

Designed especially for machining locomotive-frame taper bolts, this turner developed by Gisholt Machine Co., Madison, Wis., is suitable for use on No. 1 L or 2 L high-production turret lathes. It can be used for turning straight diameters, which permits the bolt to be finished completely in one setting. The standard unit will cut a taper having a maximum diameter of $2\frac{1}{2}$ in. and a minimum diameter of $\frac{5}{8}$ in. with a length of about 14 in.

A guide bar with tapered guide cam actuates the rollers and cutters and is fastened to the head stock, sliding in the angle way on the turner. Guide bar is arranged so that it can be swung out of the way when not in use, thus clearing the way for other operations. In operation, as the carriage feeds forward, the cam depresses the roller follower which rotates a quill inside the turner, thus moving the tool slide and roller slides upward at a uniform rate.

Williams Torque "Measurrench"

The No. B-21 "Measurrench" developed by J. H. Williams & Co., 75 Spring St., New York, N. Y., is designed for measuring right-hand turning torque. This tool is equipped with various sizes of detachable socket bits for servicing hollow screws having $\frac{1}{8}$ to $\frac{5}{16}$ in. hexagon drive openings. It is calibrated with numbers corresponding to number of the various size bits which it accommodates. When the index line on the bar touches the line indicating the piece

number of the bit, the proper load has been applied to the hollow-screw. Since the head may be moved along the bar, this tool may be transformed into a conventional sliding T-handle and used without the measuring feature.

South Bend 12-Speed 9-In. Bench Lathe

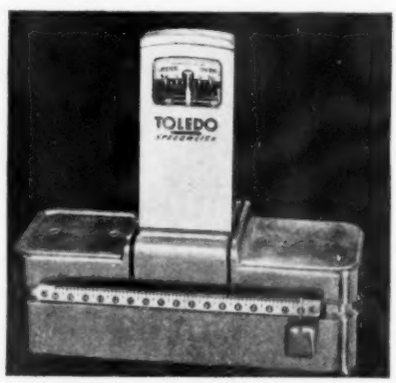
Spindle speeds ranging from 40 to 1,200 r.p.m. are provided in the improved back-geared, 9-in. precision metal-working bench lathe announced by South Bend Lathe Works, 426 E. Madison St., South Bend, Ind. This lathe will cut screw threads from 4 to 112 per in., and has power longitudinal turning feeds of 0.002 to

0.015 in.; drive is from a $\frac{1}{3}$ hp. motor through an adjustable, horizontal countershaft with two-step pulleys.

Toledo "Speedweight" Over-and-Under Scale

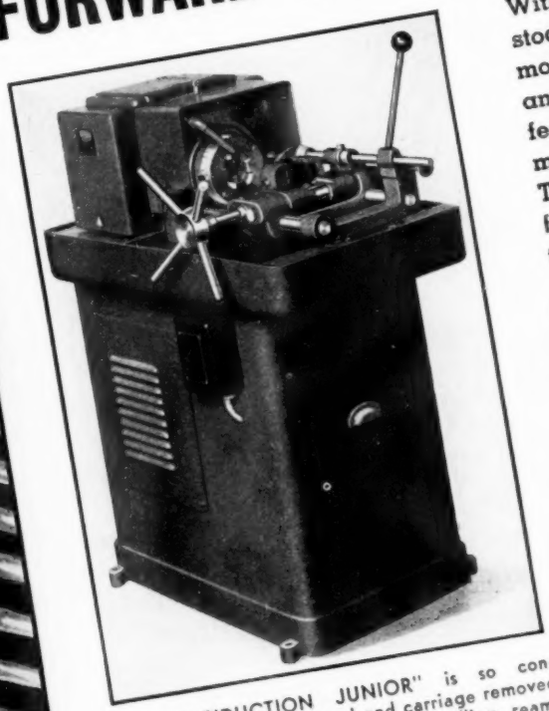
The "Speedweight" pre-determined weight scale announced by the Toledo Scale Co., Toledo Ohio, weighs 13 lb. and is fitted with a carrying handle which fits flush with the top of the housing when not in use. There are no pin connections, cone pivots or push rods and the only points of movement are protected by special ball bearings.

The Model 1095 center-tower type scale shown measures 16-in. long, $7\frac{1}{4}$



A GREAT STEP FORWARD IN A FORWARD STEPPING INDUSTRY

With a capacity up to 1½" solid stock, spindle and gears mounted in anti-friction bearings and many other mechanical features found only in larger machines, the new "RAPIDUCTION JUNIOR" is a great step forward in the threading industry.



The "RAPIDUCTION JUNIOR" is so constructed that with die-head and carriage removed it can be adapted to chamfering, drilling, reaming, boring, tapping and many other jobs.

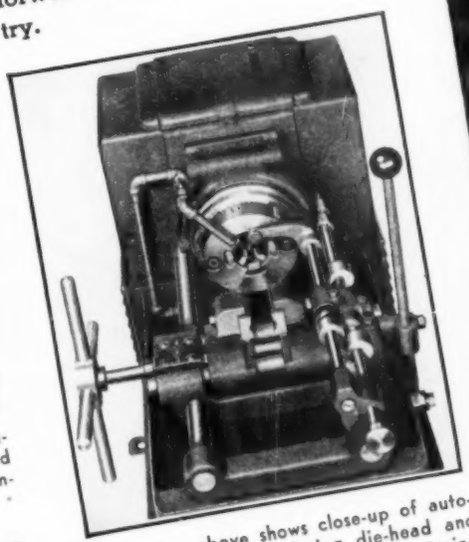


Illustration above shows close-up of automatic opening and closing die-head and stock-stop; open type, quick-centering vise; feed lever and rigidly supported ways on which carriage is mounted.

Investigate the "RAPIDUCTION JUNIOR" as a means of reducing your threading costs at the lowest possible initial investment. Get details and specifications today, from—

THE OSTER MANUFACTURING COMPANY

Sales office: 2049 East 61st Street, Cleveland, Ohio
Factories — Erie, Penna., and Cleveland, Ohio
New York City Office, 30 Church St.
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Threading Headquarters Since 1893

OSTER
THREADING EQUIPMENT
WILLIAMS

in. wide and 15⅛ in. high. It is equipped with a notched stainless steel beam of 1 pound capacity notched for each ¼ oz. Figures and graduations are etched directly into the beam. For applications where the end-tower type scale is preferable, the Speedweigh Model 1091 scale is available. These scales have a total capacity of 5 lb. and the chart reads 1 oz. over-and-under zero by ¼ oz. graduations.

"Cupaloy" Material

Because of its high strength and hardness, wear resistance, heat endurance and high electrical and heat conductivity, "Cupaloy" is recommended by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., for use as welding tips, where it has shown a service

life considerably greater than pure copper and other low-resistance alloys. This material, a mixture of copper, chromium and silver, can be treated to give an elastic strength of 35,000 lb. per sq. in. with but little impairment of its heat or electrical conductivity.

"Sterling" Salt Tablet Dispenser

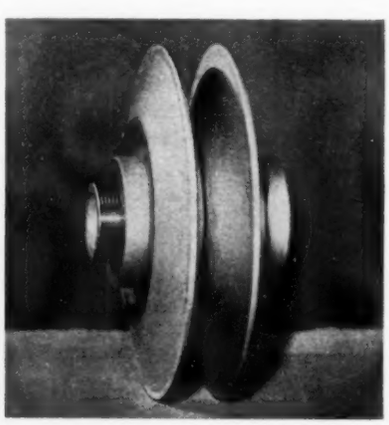
A convenient molded plastic dispenser is offered by the International Salt Co. Inc., Scranton, Pa., for mounting near drinking fountains to dispense "Sterling" salt tablets when

there is danger of heat sickness. This dispenser slips into place in a bracket and the top unscrews for filling. A label on the case gives directions for taking the tablets.

Trane Gas-Fired Air Conditioners

Gas-fired air conditioners in suspended and floor-type models are offered by The Trane Co., LaCrosse, Wis., with capacities ranging from

90,000 to 180,000 Btu. imput. These units are designed for automatic operation during year-around use. All parts, including controls, are inclosed in a single cabinet at the factory. After the pilot has been lighted for the winter conditioning season, the thermostat automatically turns the heat on when required, and shuts it off when the proper temperature is reached. These units heat, cool, humidify, dehumidify, cleanse and ventilate automatically.



Texsteel "2-3-4" Adjustable Sheave

A combination single-groove adjustable Texsteel sheave for double-duty has been announced by the Texrope Div., Allis-Chalmers Mfg. Co., Milwaukee, Wis. This sheave has a range of pitch diameter varying from 2 to 3 in., and from 3 to 4 in. by merely removing the adjustable plate, reversing and again placing it on the hub. Making use of the "Duro-Brace" principle of construction, this sheave is said to be rigid and true-running.

Royal No. 725 Industrial Chair

Seat and curved adjustable back-rest of the No. 725 Industrial Chair offered by Royal Metal Mfg. Co., 1138-40 S. Michigan Ave., Chicago, Ill., are made of tempered Masonite. This

material has an impregnated finish that will not split, crack or peel. Seat is 18-in. high and leg braces are double riveted.

Stackbin Improved One-Piece Box

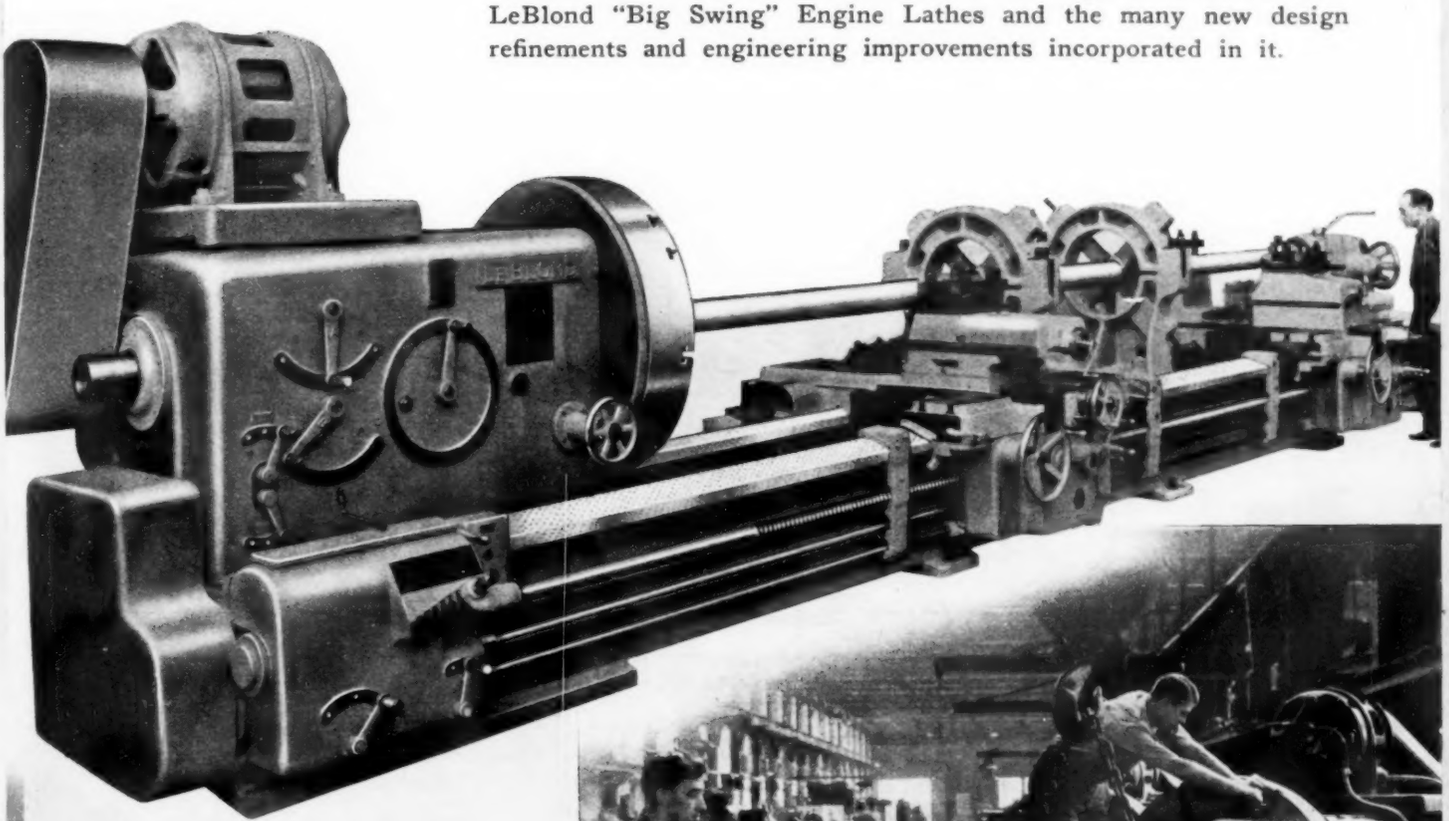
Rim of this one-piece, light-weight stacking box offered by Stackbin Corp., 54 Troy St., Providence, R. I., is made of No. 14 gage steel in double

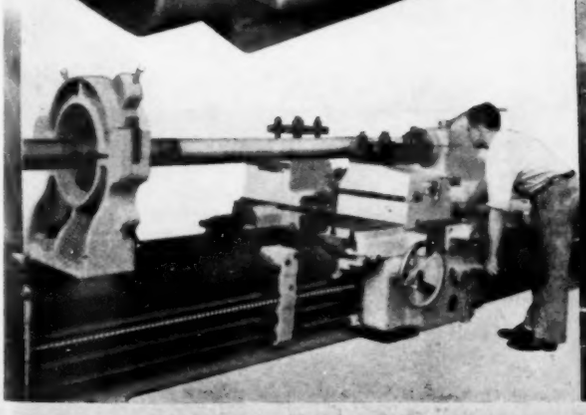
It's the NEW "BIG SWING" LeBlond 42" & 48" ENGINE LATHE

COLOSSAL in size . . . tremendous in power . . . gigantic in the work it handles! Yet it operates with the quiet smoothness, the unfailing certainty, and the hairline precision and accuracy of all LeBlond Engine Lathes.

The LeBlond "Big Swing" 42" and 48" lathe is the latest of a long line of master machines. It is not a smaller swing lathe, *raised,* but designed specifically for its particular requirements—*plus!*

Write for illustrated, detailed folder describing the marvelous new LeBlond "Big Swing" Engine Lathes and the many new design refinements and engineering improvements incorporated in it.





THE R. K. LEBLOND MACHINE TOOL CO.
CINCINNATI - - OHIO

thickness, formed in one piece and welded to make a solid rim which resists corner bending. The rim rests upon and is welded to the sides of the box.

Crane No. 253 ½-H Air Pump Unions

Developed for high-pressure lines subject to piping strains and vibration, expansion and contraction, such as locomotive service, the No. 253 ½-H forged steel air pump unions announced by Crane Co., 836 S. Michigan Ave., Chicago, Ill., conform to the specifications and recommended practice of the Association of American Railroads for 300-lb. air pump unions. They are recommended for 600 lb. steam working pressure at 550 F., and for 2,000 lb. cold water, oil or gas non-shock lines.

Magnus Cleaner

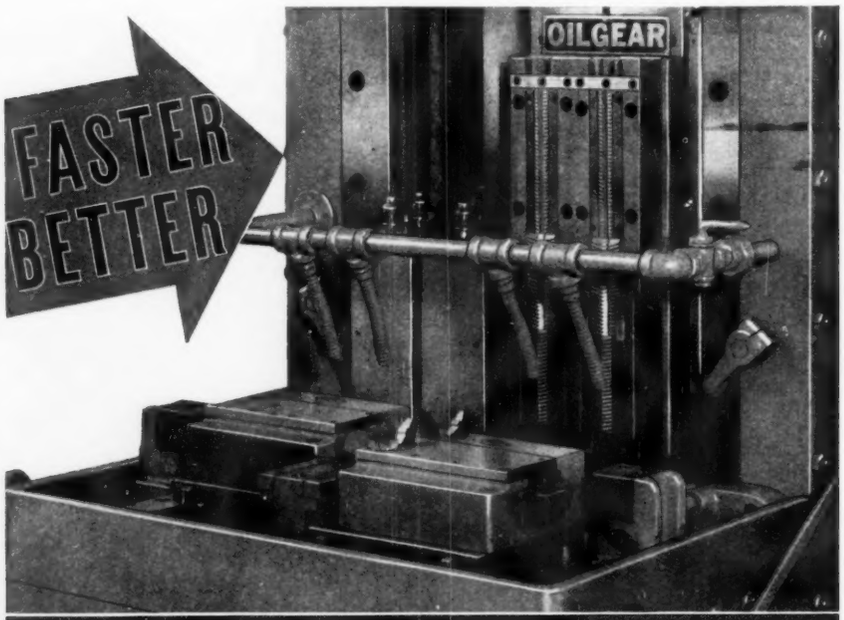
Magnus Chemical Co. Inc., Garwood, N. J., offers a cement cleaner for floors and driveways. This material is completely soluble by stirring into water and penetrates every crack to draw grease and oil to the surface. It is claimed that a solution made by mixing 3 lb. of the cleaner with 10 gal. of water will clean a 100 sq. ft. area.

Sudbury Round Composition Belting

No special tools or fasteners are required to join the ends of the round composition belting offered by Sudbury Laboratory, P.O. Box 979, South Sudbury, Mass. It is necessary only to remove 2 in. of the composition and tie the ends of the core together. The inner core of this composition belting is made of a strong, flexible material and is claimed to be able to stand an indefinite amount of flexing.

Smootharc "Hartung" Welding Electrode

Smootharc "Hartung" welding electrodes announced by the Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis., are recommended for making tool steel cutting edges on medium carbon steel or for rebuilding worn tools and dies. Analysis of the deposited metal is claimed to be equal in composition and in property to the highest grade of high-speed tool steels. It has air-hardening properties which, without treatment, possess hardness values in excess of 60 Rockwell C.



SURFACE BROACHING—WITH OILGEAR

It must be remembered Oilgear is the one proven means of applying power smoothly, flexibly, controllably, efficiently. And that successful broaching must have just those features for which Oilgear alone is famous. Oilgear Surface Broaching Machines thus quite naturally provide a smoothness of operation, an incomparable dependability of performance, and such low maintenance costs that experienced shops will consider no other makes. Oilgear Surface Broaching Machines are pushing production at close tolerances past any records known before. If you want to check what this means in terms of your product, send for full information including Bulletin 23,000A. THE OILGEAR COMPANY, 1301 W. Bruce St., Milwaukee, Wis.

- One or more pieces finish-broached simultaneously
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- Welded all-steel construction
- 6, 10, 16, 20 ton capacities

OILGEAR SURFACE BROACHING MACHINES

TRADE PUBLICATIONS

ACCIDENT RATES Four bulletins giving data on accident rates for 1937 in the steel, foundry, nonferrous metals and metal products industries have been published by the National Safety Council, Inc., 20 N. Wacker Drive, Chicago, Ill.

BOLTS AND NUTS Pawtucket Mfg. Co., Pawtucket, R. I., is distributing a bulletin and price sheet listing Herculoy and Everdur copper silicon bronze bolts, nuts and washers.

COATINGS American Concrete and Steel Pipe Co., P.O. Box 1428, Arcade Station, Los Angeles, Calif., has published a 16-page booklet describing the properties and uses of various "Amercoat" cold-applied, corrosion-resistant coatings.

COOLING RATE: "Effect of Carbon on the Critical Cooling Rate of

High-Purity Iron-Carbon Alloys and Plain Carbon Steels" is the title of Research Paper No. RP1092, prepared by Thomas G. Digges, National Bureau of Standards, U. S. Department of Commerce. Copies can be obtained from the Superintendent of Documents, Washington, D. C., at 10 cents each.

DIRECT READING "Eliminate Cut and Try" is the title of a four-page bulletin, No. 495-B-638, discussing the application of direct reading counters and large micrometer dials on lathe carriage aprons for readings of diameters and carriage travel, announced by the Lodge & Shipley Machine Tool Co., Cincinnati, Ohio.

DUST COLLECTION The Kirk & Blum Mfg. Co., Cincinnati, Ohio, is distributing a fully illustrated catalog entitled "Dust Collecting Systems in Metal Industries."

DUST CONTROL Bulletins No. 90 and 91, announced by the W. W. Sly Mfg. Co., 4700 Train Ave., Cleveland, Ohio, describe typical dust collection installations and the improved "Centri-Merge" wet dust collector.

EMBOSSING Section E of Catalog No. 22, offered by Ferracute Machine Co., Bridgeton, N. J., discusses the features of standard embossing, coining and taggle-embossing presses.

FLASHLIGHT Two bulletins offered by the Bright Star Battery Co., Clifton, N. J., describe features of the No. 1616 industrial flashlight.

GAS ENGINE Bulletin No. S-550-B14 offered by Worthington Pump & Machinery Corp., Harrison, N. J., describes Type LPE vertical four-cycle gas engines.

HARD SURFACING Use of Amsco No. 459 welding rod for hard-surfacing operations is discussed in a folder now being distributed by the American Manganese Steel Div., American Brake Shoe & Foundry Co., 389 E. 14th St., Chicago Heights, Ill. Bulletin No. 10C also gives data on hard-surfacing operations.

LEATHER BELT No. 35 of the Industrial Leather bulletin published by Alexander Bros., Inc., 406 N. Third St., Philadelphia, Pa., includes a description of the testing laboratory maintained in the Williamsport, Pa., plant.

LUBRICATION Bulletin No. B-30 offered by Rivett Lathe & Grinder, Inc., 20 Riverview Road, Brighton, Boston, Mass., discusses automatic oil lubrication with the "Blanchard Pulsolator" automatic system for oil lubrication.

MARKING Use of the "Paintcil" for marking hot and cold metal parts is discussed in a mailing folder, Form No. PL-100, offered by Helmer-Staley, Inc., 325 W. Huron St., Chicago, Ill.

OLITE BEARINGS Chrysler "Olite" oil cushion precision bronze bearings distributed by Boston Gear Works, Inc., North Quincy, Mass., are discussed in a 16-page bulletin, Form No.4-38.

PROCESS CONTROL Bulletin No. 511, announced by The Bristol Co., Waterbury, Conn., discusses recent installations of the coordinated process control system and points out principal operating results of each application.

PORTABLE TOOLS Bulletin No. 372 announced by Wodack Electric Tool Corp., 4627 W. Huron St., Chicago, Ill., describes a number of portable electric tools for various purposes.

REPORTS TO EMPLOYEES The Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York, N. Y., has prepared a bulletin entitled "Reporting to Employees on Company Operations." This is the result of a study of the

"Guide to Treatment" Shipped With the Steel

RYERSON R CERTIFIED STEELS

Ryerson Certified Alloy Steels are not only shipped quickly, but complete information arrives with the bars, including chemical and physical properties and record of heat treatment results. In this way, the heat treater knows what is in each alloy and exactly how to treat it for the best possible results.

This unique alloy plan, never before attempted by any steel service company, is the outstanding feature of Ryerson Certified Steels.

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Welding Rod
Rivets, Bolts, Nuts, etc.
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methods used by 44 companies that regularly are providing their employees with special annual reports of the results of company operations.

ROLL FORMING Tishken Products, Livernois and Van Buren Sts., Detroit, Mich., has published a 32-page, fully illustrated bulletin describing various roll forming, edge conditioning, straightening and automatic cut-off machines.

SOCKET SCREWS Bulletin No. 836, published by The Bristol Co., S. Main St., Waterbury, Conn., lists standard Bristo socket set and cap screws. Also, Bulletin No. 729 gives information on steel belt plates and rivets.

ROLL GRINDERS Bulletin No. 125, announced by Norton Co., Worcester, Mass., discusses the features of 20–36 in. Type D roll grinders with traversing work tables.

SWITCHES Open knife switches, fuse blocks and cut outs are described in Bulletin No. 400, offered by The Trumbull Electric Mfg. Co., Plainville, Conn.

SOCKET SCREWS Catalog No. 30, a 40-page pocket size bulletin announced by the Holo-Krome Screw Corp., Hartford, Conn., gives complete information regarding standard and special "Fibro Forged" socket head cap screws, hollow set screws and socket head stripper bolts.

SLIDE RULE Dayton Rogers Mfg. Co., 1845 E. Franklin Ave., Minneapolis, Minn., is distributing a slide rule that will give the correct weight of various flat materials in a range of widths, thicknesses and lengths.

TIPPED TOOLS A 12-page bulletin recently published by Tungsten Carbide Tool Co., 7171 E. McNichols Rd., Detroit, Mich., lists standard types of tungsten carbide and tantalum tipped tools.

TRADE UNIONS "A Trade Union Library" is the title of a selected book list and sources of current information for the trade union executive, prepared by Helen Baker, assistant director, Industrial Relations Section, Department of Economics and Social Institutions, Princeton University, Princeton, N. J. Price, 25 cents per copy.

TRANSFORMERS Type PV-130 portable voltage transformers are described in Catalog Section No. 43-131 announced by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TUBES Section 18 of the "Steel Products Manual" published by the American Iron & Steel Institute, 350 Fifth Ave., New York, N. Y., is entitled "Steel Tubular Products" and gives definitions covering various standard pipe and other tubular goods, together with manufacturing tolerances applying to each class. Price, 15 cents each.

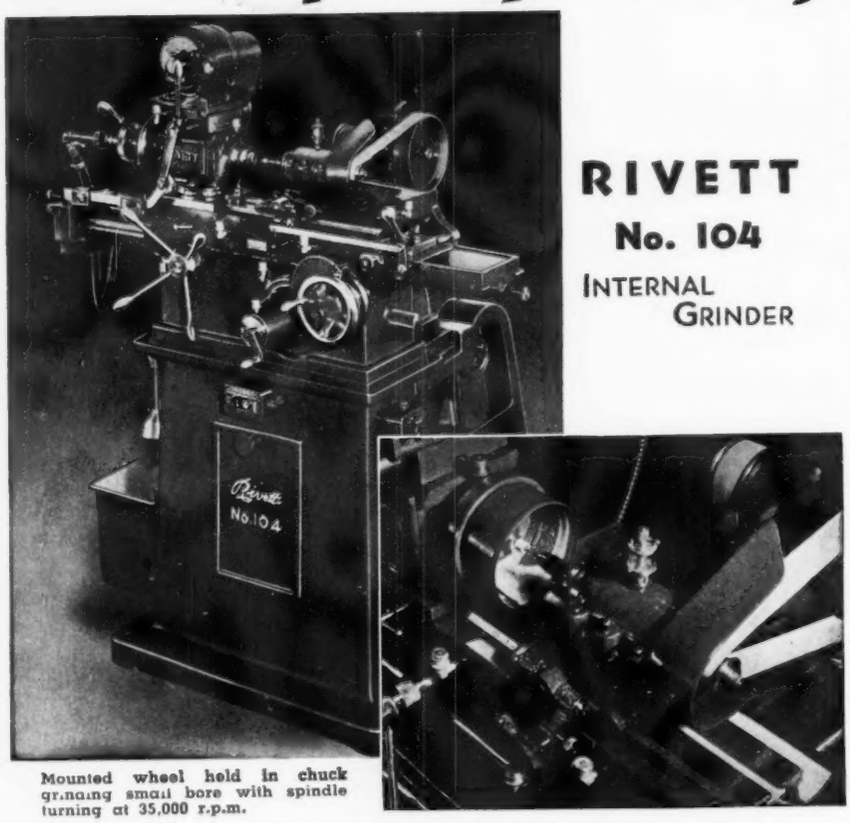
TURBINES Type C steam turbines, particularly adapted to individual applications, are described in a 12-page illustrated bulletin announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Ask for Booklet No. B-2084-A.

UNIVERSAL GRINDERS "Multipurpose" hydraulic universal grinders of 12, 14 and 16-in. sizes are described in detail in Bulletin No. 1668 offered by Norton Co., Worcester, Mass.

WASHERS Stock List No. 55-B published by Wrought Washer Mfg. Co., 2100 S. Bay St., Milwaukee, Wis., lists a large number of washer specifications in various materials and available for immediate shipment.

WELDING "Joined for Life" is the title of a four-page bulletin discussing construction with welded Monel, nickel and Iconel, offered by The International Nickel Co., Inc., 57 Wall St., New York, N. Y.

Small Hole Grinding



Mounted wheel held in chuck grinding small bore with spindle turning at 35,000 r.p.m.

RIVETT
No. 104
INTERNAL
GRINDER

The Rivett No. 104 Grinder is designed to meet demand for a small hole grinder suitable for precision tool making and accurate manufacturing. It may be used as a single purpose machine in efficient production or readily and rapidly set up for the many varying requirements of the toolroom. Correct in proportion and design, the extremely high spindle speeds necessary for small hole grinding can be maintained within the required limits absolutely free from vibration.

Although primarily an internal grinder, an external grinding attachment can replace the internal spindle bracket. The Rivett fixed diamond method is used for truing both internal and external wheels to maintain sizes on duplicate work. For further information write for bulletin 104-C.

RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.

NEW BOOKS

JIGS AND FIXTURES. *Third edition. By Fred H. Colvin, Editor Emeritus of American Machinist, and Lucian L. Haas. 354 pages, 6 x 9 in. Indexed and illustrated. Clothboard binding. Published by McGraw-Hill Book Company, 330 West 42nd Street, New York, N. Y. Price* $3.50.

This third and revised edition includes a number of details of various features to assist the designer in producing efficient and economical workholding devices. It includes new material on economics of design and standard practices which are of importance in determining costs.

While much of the original material has been retained, because it deals with the fundamentals of jig and fixture design, it has been rearranged and reinforced with new information from well-known sources. Standards for jig bushings, T-slots, tongues and bolts are given, as is an extract from a paper by Professor J. V. Roe on the economies of jig and fixture design.

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DESIGN OF MACHINE MEMBERS. *By Alexander Vallance, Associate Professor of Mechanical Engineering, University of Texas; Chief Designer, Reed Roller Bit Co. 514 pages, 6 x 9 in. Illustrated by half-tones and line drawings. Bound in cloth boards. Published by McGraw-Hill Book Company, New York and London. Price* $4.

Professor Vallance's book is the first volume to be published in the new McGraw-Hill Product Development Series. It is intended primarily as a textbook for students who have had some experience with kinematics, mechanics and factory processes. Much space is devoted to materials, factors of safety and utilization, and the selection of design stresses.

The book is not in any sense a machine designer's reference handbook, although it does contain a number of tables. Many problems are included, so devised that the student will be forced to use a certain amount of judgment, and thereby learn that machine design involves more than straight mathematics.

The chapter headings are: Stresses in elementary machine members; Materials; Working stresses and factor of safety; Riveted joints; Welded joints; Bolts and screws; Keys, cutters, and knuckle joints; Cylinders, pipes and tubes; Flat plates and cylinder heads; Springs; Shafts; Couplings and clutches; Brakes; Sliding bearings; Roller and ball bearings; Belts and belt conveyors; Rope drives; Hoisting and power chains; Toothed gearing on parallel axes; Bevel and worm gears; Metal fits and tolerances; Miscellaneous machine members; Problems for assigned work.

•

METALLURGY. *By Paul G. Johnson, assistant professor of mechanical engineering, Worcester Polytechnic Institute; R. S. Dean, chief chemist, United States Bureau of Mines, and J. L. Gregg, Battelle Memorial Institute. 149 pages, 5½ x 8¼ in. Clothboard binding. Indexed and illustrated. Published by American Technical Society, Drexel Ave. at 58th St., Chicago, Ill. Price,* $1.50.

In this volume the subject of metallurgy is introduced in a simple, concise way. The authors' attempt to convey to the reader the basic elements and processes which concern the manufacture and behavior of metals.

Stress is placed on what the authors term physical metallurgy as opposed to the melting, refining and preliminary processing of metals from their

Gorton Duplicators cut tool room costs 50 to 80% on duplicate or multiple cavity molds, and original molds from built-up masters

Die casting molds of irregular shape and involving a lot of detail are "naturals" for the Gorton Duplicator. It follows any shape just as easily as flat or uniformly curved surfaces. Dies for these casket hardware parts were made by the Madison-Kipp Corp. for a European client.

The more complex the pattern, the more time can be saved on the Duplicator compared with usual die sinking methods. A coin chute die, lower half, for instance, was reproduced in 36½ hours on the Duplicator to tolerances of plus or minus .001 in all dimensions compared with 100 hours to make the original.

GEORGE GORTON MACHINE CO.
1103 13TH ST., RACINE, WIS.

ores which they class as chemical metallurgy. In short, the book is meant to appeal to those whose interest is mainly in the working of metals as they are furnished as raw materials for use in fabrication.

The volume describes such subjects as testing of metals, manufacture of iron and steel, an outline of the theories behind the physical state of metals such as the iron-carbon diagrams, heat treatment and standard specifications.

The authors have evidently had in mind presentation of the subject to those who wished to get a general knowledge of metallurgy in a short time with the view of following in detail certain specific phases of it at a later date.

•

DESIGN AND SHOP PRACTICE VOLUME—*Kent's Mechanical Engineers' Handbook. Eleventh Edition. Edited by Robert Thurston Kent, M.E., with the collaboration of a staff of specialists. More than* 1,300 *pages,* 5½ x 8⅜ *in. Indexed and illustrated. Flexible binding. Published by John Wiley & Sons,* 440 *Fourth Ave., New York, N. Y. Price,* $5.00.

Division of Kent's Mechanical Engineers' Handbook into two volumes has made it possible to devote more space to the various topics in this "Design and Shop Practice" volume. This volume practically has been rewritten to include developments during the past ten years of many new materials of engineering and improvements in tools, machinery and processes that have made many of the data in the earlier editions obsolete.

There are 28 sections into which the material in this handbook is divided. These deal with: (1) general properties of materials; (2) iron and steel; (3) corrosion and corrosion-resistant metals; (4) non-ferrous metals and alloys; (5) non-metallic materials; (6) fabricated materials; (7) strength of materials; (8) mechanism and mechanics; (9) fastenings; (10) mechanical springs; (11) rotating members; (12) keys, cotters, pins, tapers and fits; (13) bearings and lubricants; (14) gearing; (15) control mechanisms; (16) vibration and noise; (17) structures and buildings; (18) industrial heating processes; (19) forging practice; (20) foundry practice; (21) the machine shop; (22) woodworking; (23) materials handling; (24) mechanical power transmission; (25) electric motors and their control; (26) miscellaneous shop equipment; (27) safety engineering; (28) mathematical tables.

•

ILLUSTRATED TECHNICAL DICTIONARY. *Vol.* 1, *Machine Elements, in German, English, French, Spanish, Italian and Russian. Edited by Walter Eppner, Verein Deutscher Ingenieure, with the cooperation of that organization, the German Standards Association, the German Union of Technical Scientific Societies, and standardizing groups from other countries.* 438 *pages,* 7 x 9½ *in. Bound in semi-flexible cloth boards. Illustrated by sketches. Published by VDI-Verlag GMBH, Berlin, Germany. Price,* 36 *RM.*

As the application of machinery spreads in countries formerly largely agricultural the need for a dictionary of technical terms in various languages increases. The third edition of the first volume of the VDI dictionary covers machine elements and has been expanded somewhat. There is a table of contents in each of the six languages used in the book, German, English, French, Italian, Spanish, and Russian. The second half of the volume contains indexes in these languages. The pages of the index section are darkened to distinguish them from the other section and are thumb indexed by languages.

The body text gives the correspond-

PLAN NOW TO SAVE MONEY
In Your Drilling Departments

3′ or 4′ Arm
9″ Dia. Column

Write for Bulletin R-21A and see the features that make this High-Speed Super-Service Radial so outstanding in convenience, speed, ease of operation and productivity. Arrange to see one of these machines in operation. It is making money for hundreds of users. To cut overhead rates and production costs this machine should be working for you now.

CINCINNATI BICKFORD

ing terms for various machine elements in the six languages, and includes small sketches where necessary.

The following main classifications are covered:

1.—Pins, Pegs, Tacks, Nails; 2.—Rivets; 3.—Bolts; 4.—Threads; 5.—Screws and Bolts; 6.—Keys, Wedges, Cotters; 7.—Springs; 8.—Hooks and Eyes; 9.—Pulleys, Rollers; 10.—Rope Pulleys or Sheaves; 11.—Belt Pulleys; 12.—Cable and Chain Drums; 13.—Friction Wheels or Pulleys; 14.—Gears and Racks; 15.—Ropes; 16.—Belts; 17.—Chains; 18.—Belt, Rope and Chain Drive; 19.—Locking Mechanisms and Brakes; 20.—Axles; 21.—Shafts; 22.—Tenons, Journals, Pivots, Spigots, Pins; 23.—Bearings, Pedestals, Pillow Blocks; 24.—Couplings, Clutches; 25.—Cranks; 26.—Eccentrics; 27.—Flywheels; 28.—Cylinders; 29.—Pistons; 30.—Stuffing Boxes; 31.—Sluice or Gate Valves; 32.—Valves; 33.—Pipes, Tubes; 34.—Cocks, Taps.

•

ELEMENTS OF MECHANISM. *Fifth edition. By Peter Schwamb, late professor of machine design, Allyne L. Merrill, professor emeritus and Walter H. James, associate professor of mechanical engineering, all of the Massachusetts Institute of Technology.* 400 *pages,* 5⅞ *by* 9 *in. Cloth-board binding. Indexed and illustrated. Published by John Wiley & Sons,* 440 4th *Ave., New York, N.Y. Price,* $3.50.

Kinematics in the field of mechanical movement is an attractive subject for the engineering student if he has any real apitude for the course of studies he has undertaken. The course usually forms the first direct link between the principles of mechanics and the practical application of machine design. Thus the student sees his previous efforts taking form in a way that will be of value to him in pursuing his chosen profession.

The volume under discussion is a time-tried classic, having been in use at the Massachusetts Institute of Technology since 1885 when it was introduced by Professor Schwamb as printed notes. The current Fifth Edition conforms with the practice of the authors in revising the work to keep it in step with modern engineering practice. Changes have to do with the subject matter, including increased attention to the laws of motion, with a thorough discussion of acceleration and the replacement of old examples by those representative of present-day practice; and with the arrangement of the book in which chapters have been placed in an order more suited to classroom use.

Team Work—A Help or a Hindrance?

ARTHUR SILVESTER

Nat Peters describes conditions that are prevalent in many small toolrooms (*AM*—Vol. 82, page 47), and it seems to me that one man who was particularly good on machining and liked it could have been delegated for machine operations only. That would have often prevented a toolmaker, as in John's case, from having to wait around until someone had finished his work in the lathe. It is obvious that there was something else lacking quite apart from cooperation of which Herb was conscious, and that was initiative on the part of the foreman who must have been aware of the condition that caused John to have to waste several hours.

Such incidents will occur unless you plan the work, and for this reason; the individual toolmaker does not and cannot get the whole picture of the toolroom's responsibility to the production department in his mind. After all, he can only be alive to his own needs and perhaps

20 *out of* 36*

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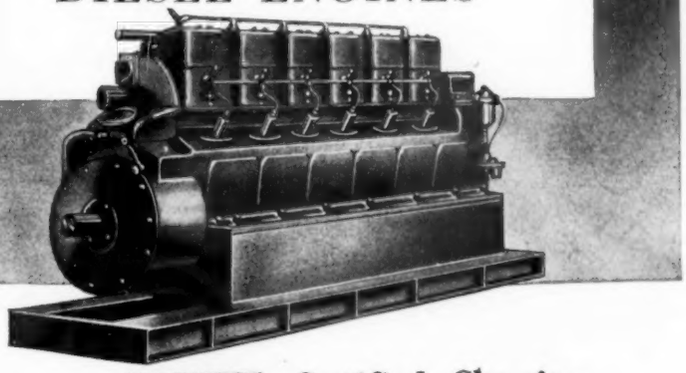

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those of the others on each side of him so far as the use of the various machines is concerned.

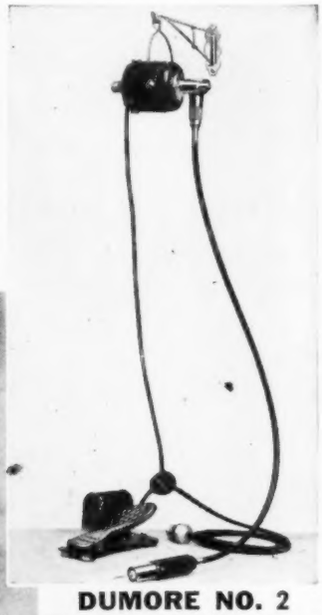
Not every job in the toolroom is exceptionally urgent, and the work can be scheduled accordingly. In any case, it should not be left altogether to the toolmakers themselves. The foreman is held responsible if some part is delayed, as in John's case, therefore it is up to him to use his initiative and give priority as the requirements demand. That is particularly so where an estimated time has been given for completion of the work. Obviously it was just a waste of time to put an estimate of time on the job in point and to put John on bonus, since he would have lost the bonus anyway by having to wait, unless Herb had cooperated and let him use the lathe.

One small concern solved the problem by the group-bonus system. All worked on a cooperative basis. The total time allotted on the work was lumped, due care being taken that the time on each job was carefully watched for cost purposes. That method put the men on a partnership basis and among themselves they soon eliminated the delays that used to occur. Whenever possible or advantageous one man did all the lathe work or all the milling, saving a lot of time. Not only that, but the men loaned each other tools and accessories.

Another concern, a premium-bonus shop, solved the problem by making one man responsible for six or eight toolmakers. Naturally, he planned the work for the best advantage of all concerned.

Both of these methods have proved successful over a period of years and have resulted in increased output for the concerns, higher pay for the toolmakers and a little better understanding all around that cooperation pays dividends.

"HOW DID WE EVER GET ALONG WITHOUT 'EM?"



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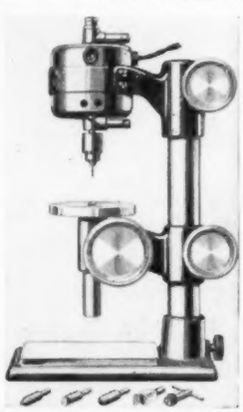

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Durability Tests on Helical Gears

G. P. MAURER
The Falk Corporation

From the results obtained in a series of tests it has been possible to draw some general conclusions regarding gear durability as related to material and hardness. These may be summarized as follows:

1. Gears of relatively soft steel have self-corrective properties, making them useful on applications where conditions of misalignment are possible.

2. Gears heat-treated after cutting are subject to distortion, often resulting in highly concentrated and localized loading. In several instances this leads to breakage of teeth by fatigue in bending at loads satisfactorily carried by material heat-treated before cutting.

3. Such distortion makes profile grinding desirable on any gears where the accurate and complete control of mass production is not available.

4. Free machining high sulphur steels allow high hardness before cutting and have proved satisfactory for small standard gears used where impact and dynamic loads are not excessive.

5. The performance of a hardened gear under uniformly applied test loads cannot be taken as a criterion of its suitability for applications involving high external shock. Impact resistance decreases as hardness and surface durability increases.

6. The effect of size of gears on material and heat-treatment indicates that additional tests are required on medium and large gears.

From a paper presented before the 22nd annual meeting of the American Gear Manufacturers' Association.